MISSION CRITICAL South-Tek Systems

direct expansion refrigerated air dryer user guide

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direct expansion refrigerated air dryer

1.1 general information

range: refrigerated air dryers
models: 103466 - 300617
doc no: 17-110-8003-G-SOUTHTEK
issue: 006-2023

LLOYD'S REGISTER · LRQA
ISO 9001
UKAS MANAGEMENT SYSTEMS
001

annotations

CAUTIONS: indicate any situation or operation that may result in potential damage to the product, injury to the user, or render the product unsafe.

NOTES: highlight important sections of information where particular care and attention should be paid.

1.2 document introduction

This manual is meant for anyone who uses or works on the direct expansion refrigerated air dryer, mainly the operators. The direct expansion refrigerated air dryer and this manual are protected by copyright. Any reproduction of the same shall be liable for prosecution. All rights reserved by **manufacturer**, particularly the rights of reproduction and distribution, as well as translation, including those relating to charges of copyright infringement. Any reproduction, processing, duplication, distribution of this document using electronic or mechanical means without the prior written authorization of **manufacturer** is strictly prohibited. This document may have errors and is likely to be modified with respect to technical features.

1.3 warranty guidelines

All products are supplied with a 30 months manufacturer's warranty from the date of shipment from the factory or 24 months from date of installation/start up, whichever occurs first and installed and maintained in accordance with the manufacturers guidelines. Pre-filters and non-corrosive upstream piping required. Only genuine service parts should be used and no modifications made.

1.4 general warnings

Read the contents of this manual carefully before starting the units.

This service and maintenance manual describes the design, operation and the instructions for use and maintenance of the units manufactured by **manufacturer**.

manufacturer shall not be liable for any damage caused due to non-compliance with the instructions of this manual.

For the smallest doubts or any clarifications that may be required, our qualified **manufacturer** technicians are available to provide all the necessary information.

In order to make it easier to identify the units, it is important to always specify the technical features, especially the serial number, which are printed on the label on the outside of the units.

The unit should not be operated, even for a short period of time, under conditions other than the ideal conditions.

A part that does not guarantee safety should not be installed.

WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and/or birth defects or other reproductive harm. For more information, go to www.P65Warnings.

1.5 basic safety rules

The installer must provide an emergency stop button on the unit. They should ensure that this is done before the unit is started.

The unit is equipped with protective covers for the components. If the unit is installed outdoors, it is important to arrange for a canopy to protect it from the snow, which could constitute a risk while using the unit if the fan blades freeze.

Replace all the supply lines of the different power sources which are damaged or missing.

Depending on the version, the refrigerants used can be either R407c or R134a. They are not harmful unless inhaled. They constitute a hazard only if they saturate the environment. Some fluids are flammable under certain conditions. Refer to the specifications of each fluid on the safety data sheet at the end of the manual.

direct expansion refrigerated air dryer

The compressor lubricant is not hazardous. However, it is always compulsory to wear safety gloves while working with it. Do not swallow the lubricant.

For any operations relating to the installation, commissioning, fitting, use, modifications of the conditions of use and methods, routine maintenance, inspection and scheduled maintenance, follow the procedures given in the corresponding chapters of this manual. Keep this manual at hand for quick reference.

The unit must be used under the conditions specified in this service and maintenance manual.

There are some recommendations given below for the **USER** that should help to avoid abnormal operating conditions. Avoid any operating conditions other than those expressly described in this manual.

- Do not climb on the unit;
- Operate the unit after it is properly installed in the recommended position;
- Operate the unit after it is properly installed in the recommended position;
- Do not start the unit without the protecting covers properly in place;
- Do not remove the protecting covers while the unit is functioning;
- Do not remove the protecting covers when the unit is switched on;
- Do not clean the unit when it is in operation;
- Do not install the unit in corrosive or explosive places;
- Do not disconnect or remove the safety devices and parts;
- It is prohibited to operate the unit under conditions other than those specified in this manual.

manufacturer shall not be held responsible for any possible damage caused, directly or indirectly, by persons or elements that are not non-compliant with these instructions.

Any assembling/removal carried out by THE USER, which is not provided for in this manual or not authorized by “manufacturer”, will be considered as an inappropriate operation, thereby damaging safety functions, and will lead to the cancellation of the warranty.

1.6 qualified operators

Only the professionals stated below are authorized to operate the unit after having received all the necessary instructions from this manual:

Specialized maintenance electrician
The electrician should have a general knowledge about electrical appliances as well as specific experience working with control boxes and the electrical components of cooling units or similar equipment from the domain of air-conditioning.
The electrician is authorized to carry out only the specific operations stated in this manual by meticulously following the associated instructions.

Maintenance technician
The maintenance technician should have a general experience working with mechanical elements and a specific experience with cooling units or similar equipment from the domain of air-conditioning.
The maintenance technician is authorized to carry out only the specific operations stated in this manual by meticulously following the associated instructions.

Refrigeration technician
The refrigeration technician should be a refrigeration certified from a technical institution for similar equipment or interventions under the authority of competent personnel.
The refrigeration technician is authorized to carry out only the specific operations stated in this manual by meticulously following the associated instructions.

Transport operator
The transport operator can carry out only the specific operations stated in this manual by meticulously following the associated instructions.

Staff allocated for the start-up and shut-down of the unit
(Basic operator and engineer operator)
After having understood the information contained in this manual, the basic operator will be authorized to manually operate the unit at the level of the following functions: start-up, shut-down, display of alarms.
In this case, this operator can carry out only the specific operations stated in this manual by meticulously following the associated instructions.

Safety officer
The safety officer is responsible for protection and the prevention of occupational risks as set forth in **OSHA Directive** (Safety in the workplace).
The safety officer shall make certain that all the persons who operate the unit have received all applicable instructions which are contained in this manual, including the initial installation and commissioning operation.

1.7 safety

Essential safety rules

! WARNING **Read this paragraph carefully and understand it before operating or servicing this machine. The machine is connected to hazardous power circuits (electricity, pneumatic circuit, etc.) and should be used with great care. This paragraph explains what needs to be understood in terms of safety before operating or servicing the machine. Non-compliance with these safety instructions risks causing injuries or fatal accidents, break-down of the machine, products (plates) or installations, or a serious incident.**

Operator

• Prior training about the operation and maintenance of the device is a prerequisite for the use and maintenance of the dryer.
• Use and maintain the dryer with the consent of the system manager.
• It is very dangerous to let a person, with poor knowledge and poor understanding about the system and how the machine functions, use it and carry out maintenance operations in an improper or negligent manner.

Before operating the dryer:

• Anyone using the dryer or carrying out its maintenance operations must read this manual carefully and understand its contents. Pay special attention to explanations with the heading “Danger”, “Warning” and “Caution” and understand them thoroughly. Follow the instructions and avoid predictable hazards when you use the dryer or carry out its maintenance operations.
• Before operating or carrying out a maintenance operation, read and understand the safety instructions stated in this manual and the safety labels affixed, on the device, and follow the instructions. Failing the above, you risk suffering facial injuries or even fatal injuries. You also run the risk of the dryer, the products (plates) or the installation breaking down or causing a serious incident.
• Other safety instructions are provided in the other paragraphs.

Warning labels (Warning)

• Warning labels are very important. Do not remove them deliberately.
• If they become dirty or illegible, or they get removed inadvertently or are lost, stick new labels in the place of the earlier ones.

Danger warning

When you use the dryer or carry out a maintenance operation on it, pay attention to the three warning levels below. Understand their content and act accordingly.
The warning messages appear on the warning labels stuck on the dryer and given in the safety instructions paragraph of this manual.

! DANGER **The “danger” messages provide warning about real dangers and indicate the risks of fatal accident or serious injuries for the operator who does not strictly adhere to the safety instructions provided to avoid such dangers. They also provide warning about the risks of an accidental gas leakage or fire due to improper handling.**
The content of the messages is identical to the warning messages, except for indicating a higher level of severity. Danger labels generally have a red background.

! WARNING **The “warning” messages provide warning about real dangers and indicate the risks of serious injuries or fatal accident for the operator who does not strictly adhere to the safety instructions provided to avoid such dangers. They also provide warning about the risks of an accidental gas leakage or fire due to improper handling. Warning labels generally have an orange background.**

! CAUTION **The "caution" messages provide warning about real dangers and indicate the risks of minor injuries for the operator, or damage to the system, products (plates) and installations, if they do not strictly adhere to the safety instructions provided to avoid such dangers.**
Caution labels generally have a yellow background.

1.8 storage

Keep away from:

- Direct sunshine, rain, wind and sand.
- Temperature: max. 140°F/min. 14°F
- Max. relative humidity: 90%

1.9 transport and handling

The carrier is always liable for any damage caused to the products entrusted to them during transport. Thus, before preparing the unit for its installation and commissioning, it is necessary to carry out a complete visual inspection in order to check that the packing cases are intact and the unit has no apparent damage and that there is no oil or refrigerant leakage. It is also important to verify that the units are the ones that have been ordered.

Any damage or complaints must be reported to **manufacturer** and declared to the carrier (or shipper) before the carrier leaves premises when product is delivered.

If there is damage to one or more components, do not start the unit but inform **manufacturer** about the problem to find a mutually agreeable course of action.

Preferably, remove the packaging at the actual place of installation.
The unit should be handled with great care on the premises. Do not use any of its components as a grip. In order to avoid any damage, it is imperative that, during their handling, the units always remain in the position set for their operation.

Do not leave the units in their packaging on premises that are exposed to strong sunshine because the ambient temperatures can affect the triggering values of the safety devices.

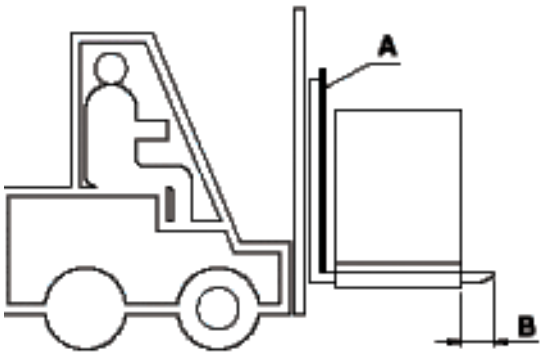
The water circuit should be completely drained before the unit is handled.

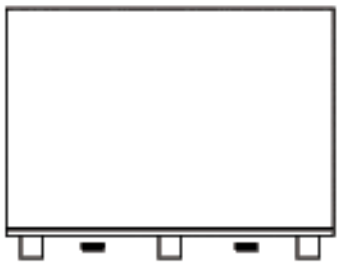
The equipment should be preferably lifted using a forklift truck. Use a spreader bar if belts or slings are used and ensure that there is no pressure on the external edges of the units or the packing case.

During transport, do not place the dryer on the ground, on the side, in order to avoid any possible problem.

Example of lifting using a forklift truck:

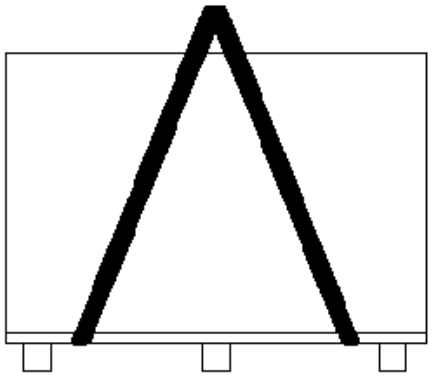
- **Insert the protection for the external structure of the unit, e.g. polystyrene or board sheet (A).**
- **Ensure that the forks of the truck jut out min. 4 inches (B) from the unit.**





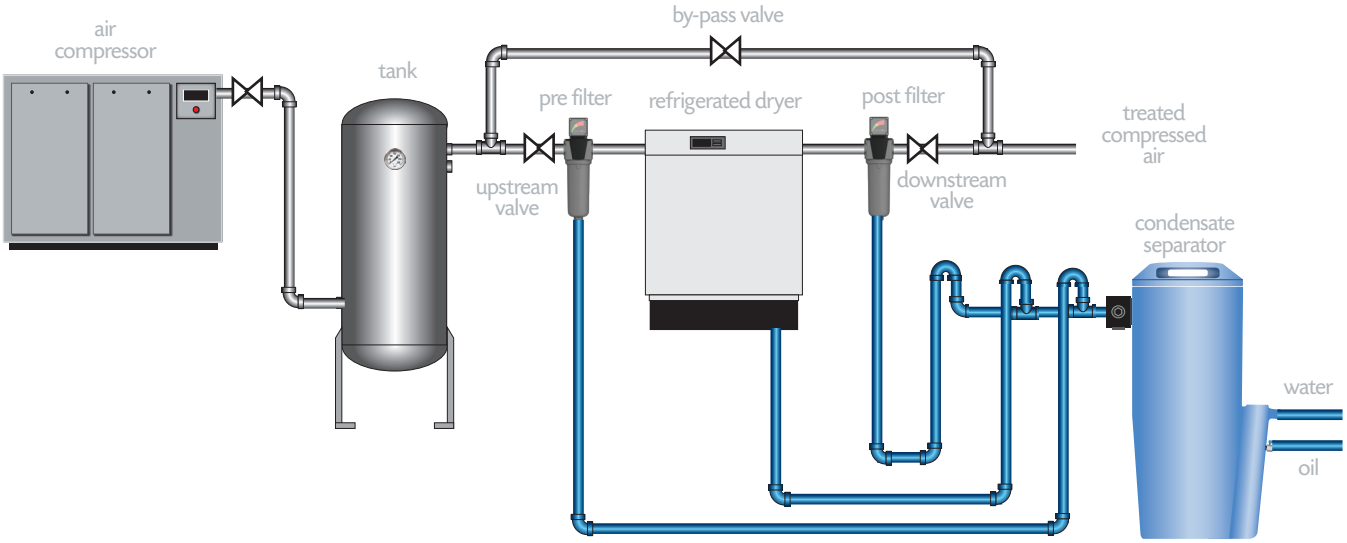
Example of lifting using slings:

- Place the slings as shown.
- Place the rigid structures on the upper sides of the unit in order to avoid damaging it (only when there is a point on which the pressure acts).
- Tighten the slings **gradually**, while ensuring that they remain in the correct position.
- Start lifting the unit.



2.1 compressed air installation principle

A backup wrench must be used when tightening air inlet and outlet pipework connections. Failure to properly tighten inlet and outlet pipework without use of a backup wrench could result in damage to the dryer and void warranty.



2.2 machine code identification

The model of the machine is written on the rating plate. It's very easy to recognize by the name (see example).

XXXX - AAA/B/60Hz

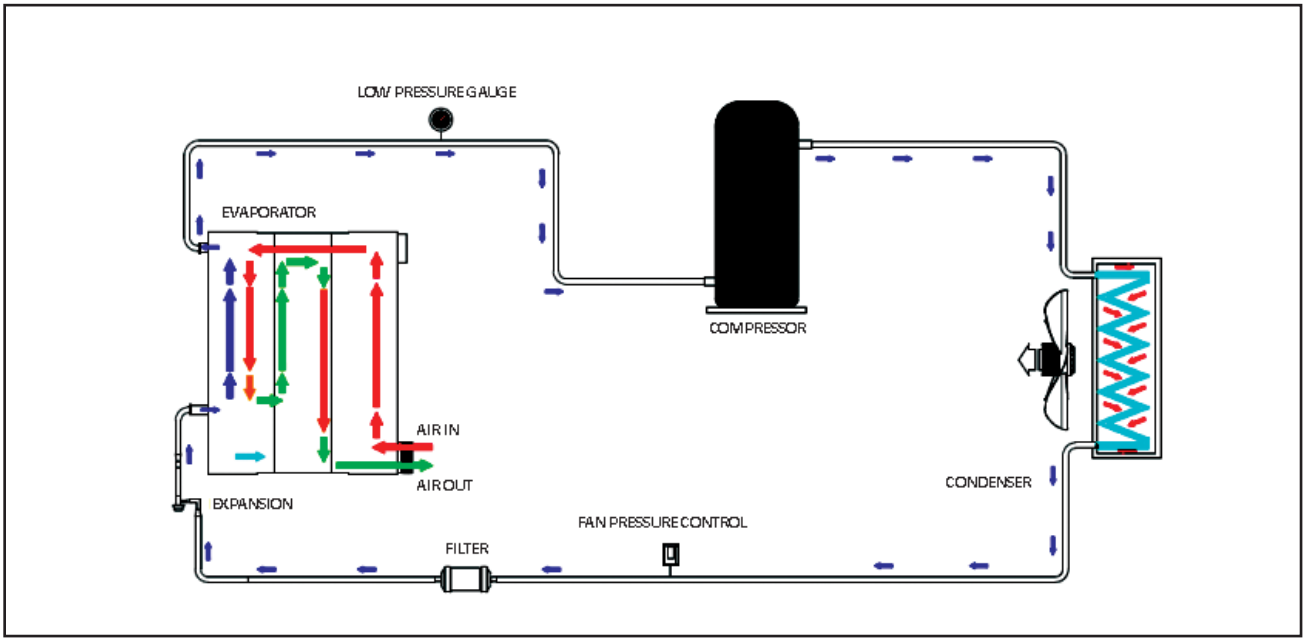
model in the range

electrical supply
AAA: voltage in V
B: number of phases

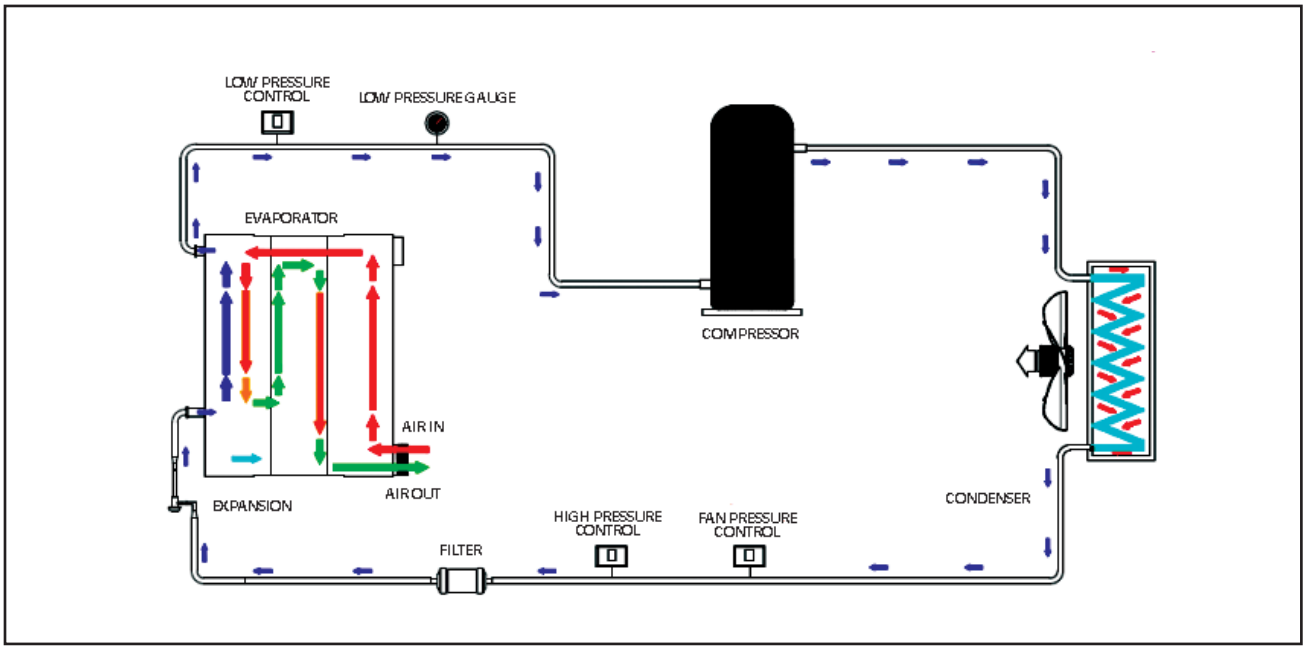
2.3 operating principle of the dryer

Schematic diagram

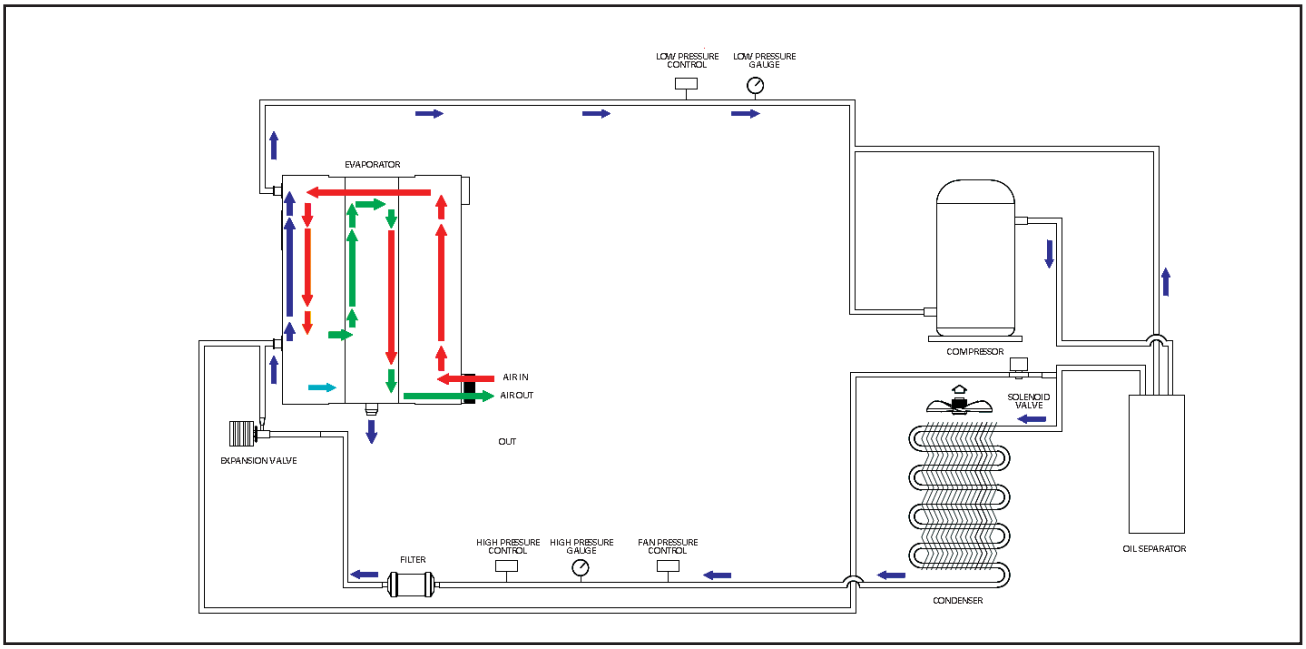
103466 to 300610



300611 to 103438



300614 to 300617



For 300614 - 300615, there is only one cooling/drying circuit. For 300616 - 300617, there is a multi-circuits cooling process in parallel.

2.4 operating principle

1. Compressed air, with high temperature and humidity (relative 100%), from the compressor enters the dryer through an air circuit/freon circuit plate heat exchanger. The compressed air is pre-cooled by the outgoing air, which is treated and colder. The compressed air then travels into the second section of the air/freon exchanger to be further cooled.
2. This next stage of cooling is controlled by the refrigeration circuit. The compressed air is cooled by the refrigerant to approximately 37 to 38°F and the saturated steam in the compressed air transforms into condensed water.
3. In the third stage, the condensed water now present is separated from the compressed air stream and evacuated from the exchanger through the use of an electronically controlled drain.
4. At the final stage the exiting compressed air is heated by the incoming compressed air prior to exiting the dryer.
5. During the changes of compressed air demand a hot gas valve regulates the temperature in the evaporator by automatically adjusting the refrigeration gas volume to maintain a consistent pressure dew point of the compressed air.

2.5 installation

Note: These instructions help to improve the service durability of the equipment. Please read them carefully and follow them.

Location of the compressed air dryer

1. Locate the air dryer on a surface in a horizontal position.

2. The air dryer can corrode quickly if it is located on a surface that is contaminated by acid or alkali.

3. The location of installation should be clear and have sufficient space. (Blocked air circulation reduces the rate of dehumidification and the service life of the dryer).
   Allow 5 feet of clear space around the dryer to facilitate maintenance operations and repairs.

4. The ambient temperature where the air dryer is installed should be greater than 32°F. The location should not have direct exposure to sun rays.
   (Ambient temperature: 32°F and up to 110°F).
   - ❄ It is necessary to arrange for suitable ventilation in order to prevent any malfunctioning.
   - ❄ If ambient temperature can fall to 32°F or below, contact your supplier to obtain specific installation or air dryer recommendations.

5. There should be no flammable products at the place of installation.

Piping

The compressed air pipework should be installed using standard tools and connected in such a way that there is no AIR leaking from the connections.

1. The compressed air piping should be assembled in accordance with the direction of circulation of the compressed air after inspection of the inlet and outlet of the AIR DRYER. (Assembling the piping in the wrong direction causes the AIR DRYER to malfunction).

2. The compressed air piping should not rest directly on the AIR DRYER. It should be supported separately.

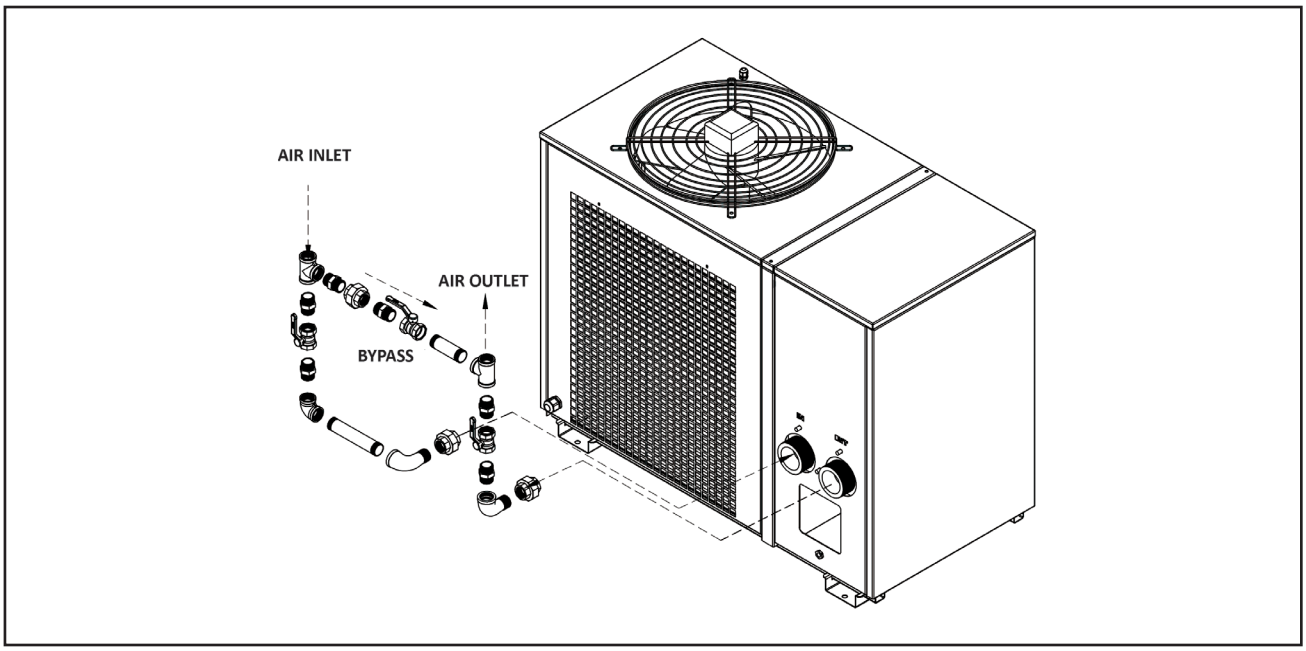
3. Condensed water coming from the outlet of the drain device should be evacuated through a separate condensate line, to a properly sized oil water separator.

4. The AIR DRYER should be isolated from the vibrations of the AIR COMPRESSOR.

5. It is recommended to use non-corrosive piping.

6. It is recommended to install a bypass in order to facilitate servicing the AIR DRYER.

2.6 by pass



Note:

Illustration is for example purposes only. Inlet and outlet connections as well as dimensional information will vary by model. Refer to the drawing of your specific model air dryer and consult with a compressed air piping contractor for appropriate installation.

Electrical connection

1. Connection : Use conductors which can carry the maximum current required at the maximum ambient operating temperature, according the type of installation chosen (see indication on the electrical diagram). Use only UL marked copper cables in conformity with NEC (National Electrical Code) and CEC (Canadian Electrical Code).
2. Appropriate protection should be installed to avoid over current and possible electrocution due to short-circuit before installing the air dryer.
3. Proper grounding should be installed.
4. Permissible operating voltage range: ± 5%
5. Refer to the electrical schematic and direct any questions to **manufacturer** technical support.

2.7 operation

Function test

Start the air dryer after the following checks are made:
Inspection of the components:

1. Is there a problem in the air system and electric circuit?
2. Has the by-pass circuit valve (optional) been closed?
3. Is the purge system valve open?
4. Is the compressed air pressure sufficient?
5. Is there a differential between the permissible rated voltage and the interrupting capacity of the fuses and the circuit-breaker?

Operating procedure

Press the “ON” power button (press the button of the controller in the front and hold for 5 seconds on CAREL controllers)

We recommend to start the dryer, prior to opening up the air inlet and outlet valves for five minutes. After starting the unit and running it for five minutes slowly pressurize the dryer to avoid any possible damage. The condensate drain should be cycled to ensure functionality and then slowly open the outlet valve to the system.

(If compressed air enters the dryer quickly, the pressure could damage parts or instruments).

❖Important❖

Wait for more than 5 minutes before restarting the dryer.

2.8 use

Initial start-up of direct expansion refrigerated air dryer

Only start up the dryer once you have thoroughly tested all the compressed air, refrigeration and electrical connections.

1. Close the isolating valves on the dryer and open the by-pass valve.
2. Check on the controller that the dryer is OFF.
3. Start the air compressor.
4. Start the dryer. (press on the arrow up button, the controller will display ON)
5. The refrigerating compressor and condenser fan will start after a 2-minute safety time-out interval.
6. Pressurize the dryer by slowly opening the inlet valve.
7. Slowly open the dryer outlet valve and then close the by-pass.
8. Check that the condensate drain opens when you push the arrow's down button.
9. Check that the condensate drain valve opens automatically every 5 minutes.

The dryer is now ready to run normally.

2.9 controller instructions

User interface - with CAREL

Modifying other parameters

Parameters access

- Press and hold SET button for 3 seconds until reach P5.
- Press the UP and DOWN arrows to scroll the list of available parameters.
- Press the SET button to show the relevant parameters value.
- Increase or decrease the parameters value by using the UP and DOWN arrows keys.
- Press the set button to memorize the parameters value and return to the parameters display.
- Follow the same procedure above to review all of the relevant parameters.
- Press and hold the set button for 3 seconds to memorize and lock in the parameters. The display will exit the parameter setting menu. Note that if this last operation of holding the set button for 3 seconds is not completed all changes to parameters will revert to previous values and modifications to parameters will not be applied.

Parameters table

parameters	description	min	max	default	unit
/4	Select probe display [1]	1	3	1	-
/C1	Offset of probe 1[2]	10.4	53.6	28.4	°F
/C2	Offset of probe 2 (not used)	10.4	53.6	28.4	°F
/C3	Offset of probe 3 (not used)	10.4	53.6	28.4	°F
Set	Set point	30	176	30	°F
Rd	Control differential (not used)	32	176	32	°F
P1	Duration of auto purge	0	999	4	Second
P2	Time interval between two auto purges	0	999	2	Minute
P3	Short manual purge cycle	0	999	1	Minute
P4	Long manual purge cycle	0	999	0	Minute
AL (not used)	Threshold/Deviation for the low temperature alarm	-58	302	32	°F
AH (not used)	Threshold/Deviation for the high temperature alarm	-58	302	32	°F

[1] In dryers, probe 1 is only used. Do not change this parameter.

[2] This offset allows taking into account the effects of heat transfer between the probe and the measured environment. Do not change this parameter.

Changing condensate drain parameters

General

- The condensate drain energizes and opens every one minutes (parameter p2) for a duration of two seconds (parameter p1). The factory setting matches the standard operating conditions of the dryer. However , you may have to:
- increase the duration and possibly the frequency of purging if the temperature of the air to be treated is higher than the rated value and if there is water in liquid condensate downstream of the dryer.
- decrease the duration and possibly the frequency of the condensate drain if the temperature of the air to be treated is less than the rated value (in the case of a water after cooler after the air compressor) or if the compressed air to be treated is not saturated with humidity (pre-drying or partial expansion).

The objective of properly adjusting the purge duration is simply to limit the loss compressed air during operation. A properly adjusted purging operation is characterized by:

- the expulsion of condensates (water/oil emulsion) for the majority of the purge time.
- a short jet of dry compressed air without condensates at the end of the purge.

Functioning of manual purge

Short cycle:

- Press the purge icon and hold for 1 second.
- The screen displays “Sho” for the first three seconds.
- Release the button to start the short purge cycle (refer to P3 parameter).

Long cycle:

- Press the purge icon and hold for several seconds.
- The screen displays “Sho” for the first three seconds and then displays “Lon”.
- When the screen displays “Lon”, release the button to start the long purge cycle. (refer to P4 parameter)

Purge Test

General

The purge needs to be tested during:

- the first commissioning,
- routine inspections,
- the depressurization of the dryer for maintenance operations.

Operating procedure

1. Press the down arrow and hold for 1 second. Check that the solenoid valve opens and that the condensate drains away. Check that the purge icon is illuminated on the controller interface.
2. The solenoid valve closes and the purging of the condensate stops.
3. Wait for 5 minutes and re-check that draining is carried out correctly.
4. If necessary, change the condensate drain duration referring to 5.4 section.

Note: The open solenoid valve will close automatically at the end of the programmed purge duration.

2.10 safety system

The dryer has a safety system which disconnects the device when triggered.

Electrical circuit

The motor protection allows disconnecting the dryer through the thermal relay when the air compressor operates under overload.

Restart

1. Resolve the problem that caused the device to shut down (refer to Corrective maintenance, or contact **manufacturer**).
2. Press the start button to restart the dryer.

2.11 routine maintenance

Daily maintenance

- Check that the drain normally evacuates the water and compressed air.
- Check that there are no air leaks on the inlet and outlet connections.
- Verify the temperature of the compressed air at the inlet and the ambient temperature are within operating parameters of the dryer specification.
- Clean the condenser of the dryer at regular intervals (once every two weeks).

Maintenance

Clean the condenser regularly using a vacuum cleaner, brush or a compressed air gun. Dirty or plugged condenser coils will impact performance of the dryer and can lead to overheating of the compressor and possible shutdown and/or damage of the dryer.

❖ **Ensure that the blades and the thin aluminum plate of the condenser do not get bent out of shape while cleaning.**

2.12 trouble shooting in the event of malfunction

At normal working conditions, check the pressure gauge of the dryer as:

1. R-134a
Below 27 psi: Refill refrigeration gas if there is insufficient volume (check for any leakage).
Above 60 psi: Remove a certain volume of refrigeration gas if there is excessive volume (due to ambient temperature and air inlet temperature, because pressure increases if temperature is high).

2. R-407c
Below 60 psi Refill refrigeration gas if there is insufficient volume (check for any leakage).
Above 140 psi: Remove a certain volume of refrigeration gas if there is excessive volume (due to ambient temperature and air inlet temperature, because pressure increases if temperature is high).

Important!
The pointer of the pressure gauge can go out of the normal working range if there are defects in other parts of the device. The settings must be adjusted properly. Consult manufacturer or a qualified refrigeration technician for assistance.

Refrigerant handling in the US and Canada is only permitted by technicians with a valid refrigeration license.

Cleaning the drain Y-strainer*

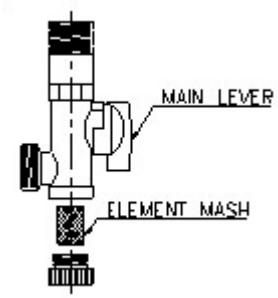
General comments

The solenoid drain is protected by a strainer to prevent damage to the solenoid valve seals from metal particles or dust. This strainer must be cleaned 1 week after the first start-up and then once per month. If this is not done, the strainer will clog and it will not be possible to purge the system correctly. Liquid phase water will appear in the compressed air network.

Procedure
1. Close the manual valve on the purge (see the refrigeration/pneumatic circuit diagram)
2. Unscrew the strainer lock nut.
3. Withdraw the metal mesh, clean and refit.
4. Check the condition of the seal and replace if necessary.
5. Tighten the strainer lock nut.
6. Open the manual valve on the purge line.

**You must comply with the recommendations at the beginning of this chapter.*

Condensate drain, strainer maintenance



The Y-strainer provided with the condensate drain helps to trap particulate contamination and minimize the potential for leakage at the drain seat. It is necessary to clean the Y-strainer periodically to maintain proper operation of the drain. How often depends on cleanliness of the compressed air pipework and other components in the compressed air stream. All models from 103466 are equipped with a Y-strainer.

Solenoid valve maintenance*

General comments

The solenoid valve must always be protected by a filter (Y-strainer) to ensure that solid particles do not prevent it from opening and closing correctly. If particles do get through the filter and cause faulty operation of the solenoid purge valve, it must be dismantled and cleaned.

Procedure

1. Close the manual valve on the purge line (see refrigeration/pneumatic circuit diagram).
2. Disconnect the solenoid valve power supply.
3. Disconnect the solenoid valve from the pipework and clamp it in a vice.
4. Unscrew the coil lock nut and take it off the plunger.
5. Unscrew the plunger from the valve seat.
6. Check the O ring and the other components. Clean carefully.
7. Re-assemble the valve by reversing operations 1 to 5.

Do not over tighten the coil lock nut as this could prevent the valve from closing.

8. Refit the solenoid valve to the pipework, respecting the direction of the air flow indicated by an arrow on the body.
9. Reconnect the power supply to the solenoid purge valve.
10. Open the manual valve on the purge line.

**You must comply with the recommendations at the beginning of this chapter.*

When contacting your service provider be sure to provide the part number and serial number of your dryer, this can be found on the rating plate.

2.13 corrective maintenance

Refer to the table below if your dryer malfunctions.

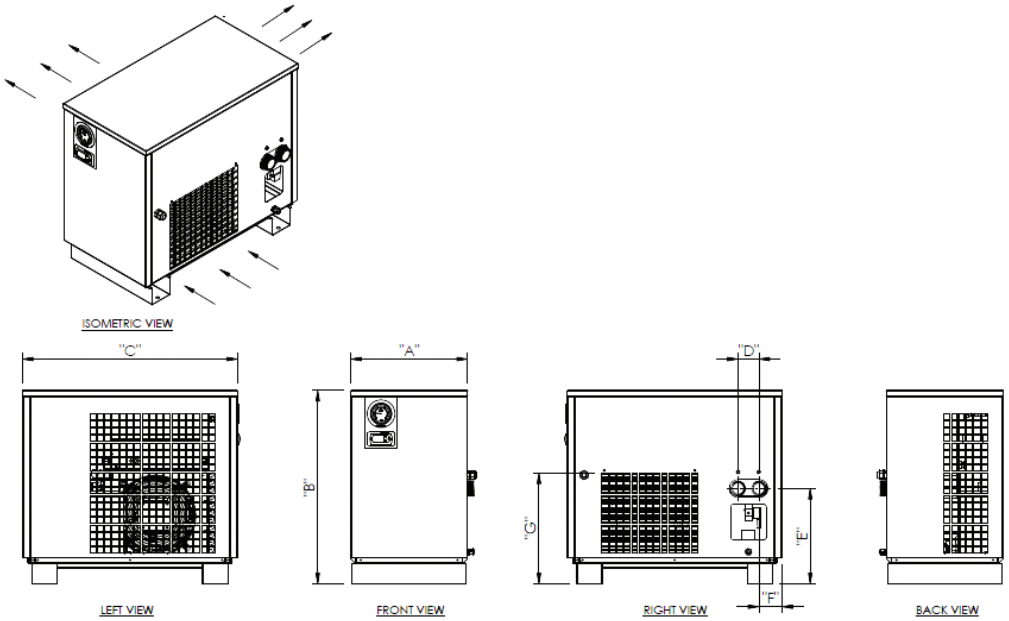
problem	cause	solution
The device does not start after pressing the Start button. (The power light does not switch on.)	Defective switch	Replacement
	Low voltage	Use rated voltage
	Breakdown of the refrigerating compressor	Replacement
The device does not start after pressing the Start button. (The power light switches on.)	Defective switch	Replacement
	Breakdown of the refrigerating compressor	Replacement
There are condensates in the dryer outlet but the refrigerant pressure gauge indicates normal pressure.	Breakdown of the refrigerating compressor	Replacement
	Breakdown of the drain valve	Replacement
	Dirty drain valve	Dismantle and clean
	Breakdown of the fan	Replacement
	Breakdown of the compressor contactor	Replacement
There are condensates in the dryer outlet but the refrigerant pressure gauge indicates high pressure.	Refrigerant leakage	Check refrigerant leakage
	Improper functioning of the heating relay	Replacement
	Open by-pass valve	Close the by-pass valve
	Light switches on instantly	Replacement
	Breakdown of the drain valve	Replacement
	Breakdown of the fan	Replacement
	Breakdown of the ventilation pressure switch	Replacement
No condensates in the outlet of the drain solenoid valve	Breakdown of the hot gas valve	Replacement and adjustment of settings

direct expansion refrigerated air dryer

problem	cause	solution
The outlet air temperature is similar or hotter than the inlet air temperature.	Breakdown of the drain valve	Replacement
	Very high ambient temperature	Cool the ambient temperature
	Breakdown of the fan	Replacement
	Breakdown of the compressor contactor	Replacement
Dryer stopped	Very significant air flow	Maintain rated air flow
	Low refrigerant charge	Check for refrigerant leakage and refrigerating check
	Blocked compressor	Clean the condenser
	Very high ambient temperature	Cool the ambient temperature
The high pressure safety lamp is switched on.	Refrigerant leakage	Check for refrigerant leakage
	Improper functioning of the heating relay	Replacement
	Open by-pass valve	Close the by-pass valve
	Light switches on instantly	Replacement
	Breakdown of the fan	Replacement
	Breakdown of the compressor contactor	Replacement
The overcurrent safety lamp is switched on.	Low refrigerant charge	Check for refrigerant leakage and refrigerating check

3.1 arrangement drawings

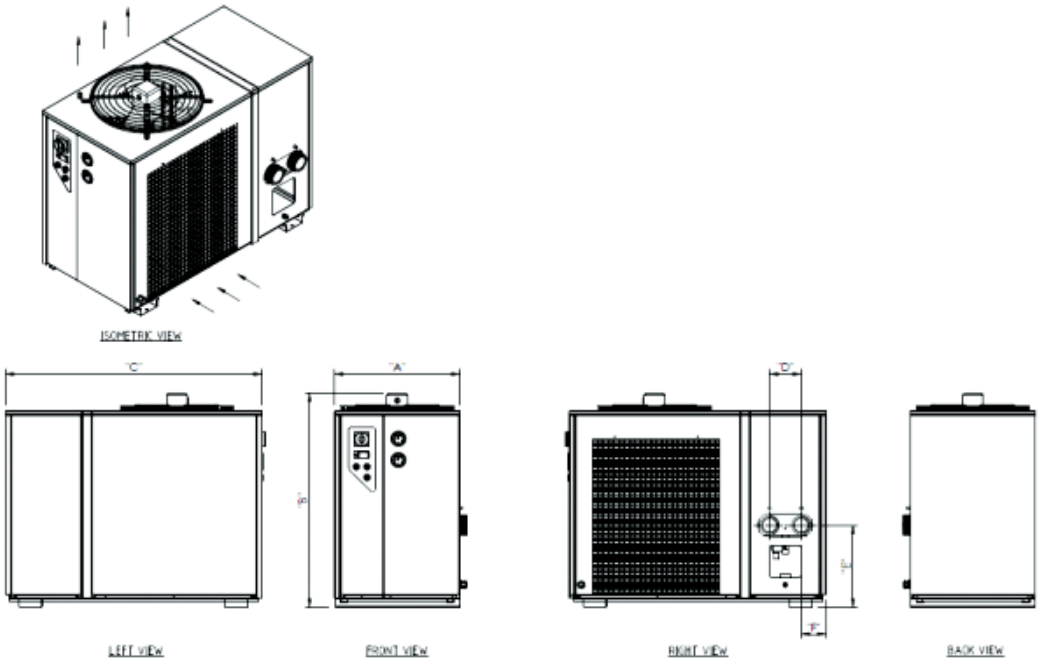
0015 to 0725



model	dimensions													
	A		B		C		D		E		F		G	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
103466	15.04	382	16.93	430	17.72	450	1.57	40	9.45	240	2.00	51	12.24	311
300607	15.04	382	16.93	430	17.72	450	1.57	40	9.45	240	2.00	51	12.24	311
900001	15.04	382	16.93	430	17.72	450	1.57	40	9.45	240	2.00	51	12.24	311
300608	15.04	382	16.93	430	17.72	450	1.57	40	9.45	240	2.00	51	12.24	311
300609	14.96	380	18.90	480	19.69	500	1.57	40	10.31	262	2.72	69	12.84	326
997034	14.96	380	18.90	480	19.69	500	1.57	40	10.31	262	2.72	69	12.84	326
103548	15.47	393	25.60	650	28.46	723	2.76	70	12.60	320	2.95	75	14.69	373
300180	15.47	393	25.60	650	28.46	723	2.76	70	12.60	320	2.95	75	14.69	373
300610	15.47	393	25.60	650	28.46	723	2.76	70	12.60	320	2.95	75	14.69	373
300611	15.91	404	29.96	761	34.45	875	2.76	70	16.57	421	3.64	93	18.62	473
300612	15.91	404	29.96	761	34.45	875	2.76	70	16.57	421	3.64	93	18.62	473
300612 (460V)	17.79	452	34.72	882	46.85	1190	5.83	148	13.78	350	8.23	209	22.55	573

model	dimensions													
	A		B		C		D		E		F		G	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
300184	17.79	452	34.72	882	46.85	1190	5.83	148	13.78	350	8.23	209	22.55	573
100618	17.79	452	34.72	882	46.85	1190	5.83	148	13.78	350	8.23	209	22.55	573
300613	17.79	452	34.72	882	46.85	1190	5.83	148	13.78	350	8.23	209	22.55	573
103438	17.79	452	34.72	882	46.85	1190	5.83	148	13.78	350	8.23	209	22.55	573

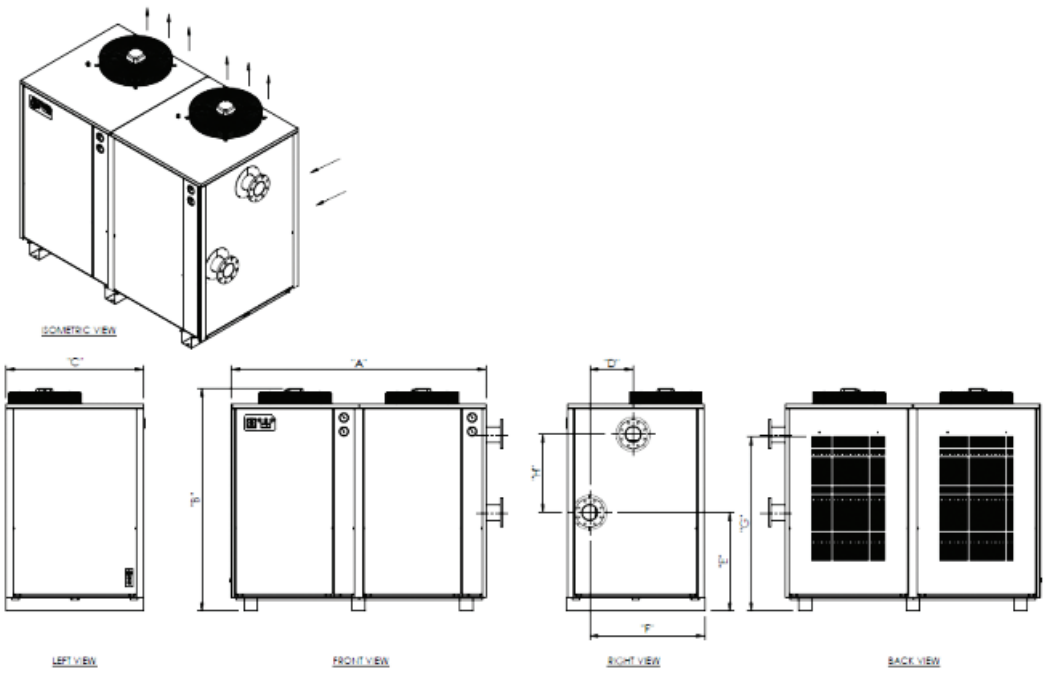
300614 to 300615



model	dimensions													
	A		B		C		D		E		F		G	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
300614	23.15	588	39.57	1005	47.40	1204	5.83	148	15.18	385	4.72	120	-	-
300188	23.15	588	39.57	1005	47.40	1204	5.83	148	15.18	385	4.72	120	-	-
300615	23.15	588	39.57	1005	47.40	1204	5.83	148	15.18	385	4.72	120	-	-

direct expansion refrigerated air dryer

300616 to 300617



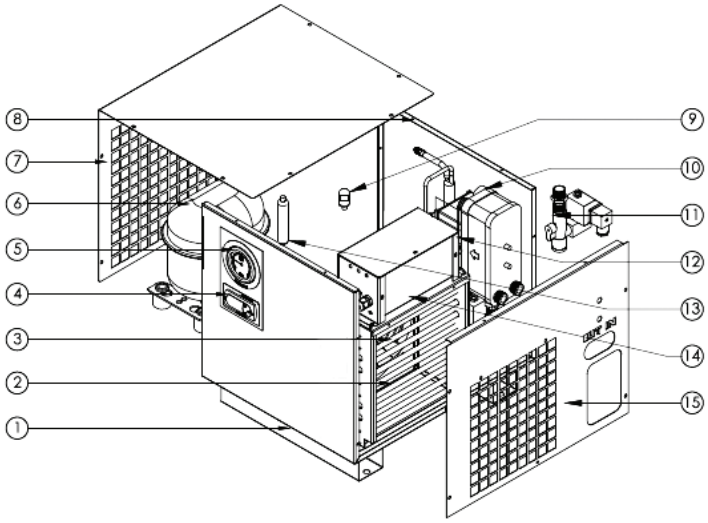
model	dimensions															
	A		B		C		D		E		F		G		H	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
300616	72.91	1852	63.58	1615	39.53	1004	12.44	316	27.99	711	32.99	838	50.32	1278	22.36	568
300617	72.91	1852	63.58	1615	39.53	1004	12.44	316	27.99	711	32.99	838	50.32	1278	22.36	568

3.2 exploded views and spare parts

**Exploded views are presented only by chassis/cabinet and not by each model.
Some parts are similar between two models of one chassis/cabinet, some others are different.
These views are provided for part identification purposes only.
When contacting manufacturer for support, please have the serial number and model of your dryer available.**

manufacturer is committed in continuous performance improvement and some parts are subject to change without prior notice.

103466 to 300608



no	description	part no	no	description	part no
1	bottom base assembly	*	8	back panel	*
2	condenser set (103466)	SC100-NDHR3	9	fan pressure switch	A0802-066N
	condenser set (300607)	SC100-NDHR5	10	evaporator unit	A1601-221N
	condenser set (900001)	SC100-NDHR8	11	solenoid valve	A0904-088N
	condenser set (300608)	SC100-NDHR10	12	control valve	A1001-139N
3	fan motor	A0601-32N	13	filter	*
4	control card	C0101-220N	14	e. box assembly	*
5	pressure gauge	A1102-040N	15	right panel	*
6	compressor	A0101-015N		dew point sensor	C0104-221N
7	left panel	*		y-strainer	A2001-028N

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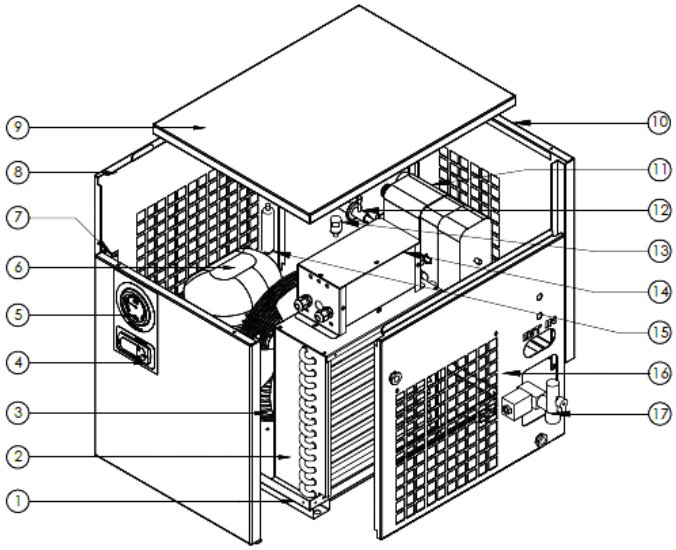
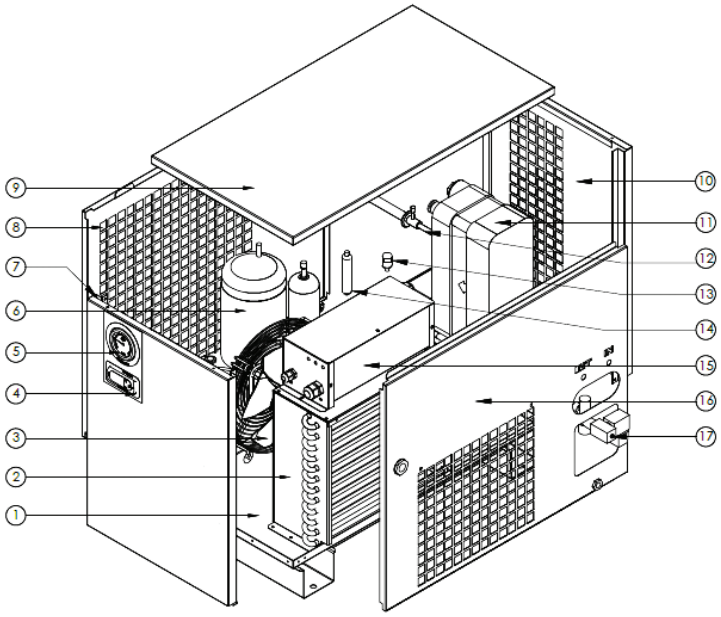
300609 to 997034



no	description	part no	no	description	part no
1	bottom base assembly	*	10	back panel	*
2	condenser set (300609)	SC100-NDHR15	11	evaporator unit	A1601-191N
	condenser set (997034)	SC100-NDHR20	12	control valve	A1001-139N
3	fan motor	A0601-033N	13	fan pressure switch	A0802-066N
4	control card	C0104-220N	14	e. box assembly	*
5	pressure gauge	A1102-040N	15	filter	A1001-087N
6	compressor	A0101-018N	16	right panel	*
7	front panel	*	17	solenoid valve	A0904-088N
8	left panel	*		dew point sensor	C0104-221N
9	top panel	*		y-strainer	A2001-028N

103548 to 300610



no	description	part no	no	description	part no
1	bottom base assembly	*	10	back panel	*
2	condenser set (103548)	SC100-NDHR30	11	evaporator unit	A1601-192N
	condenser set (300180)	SC100-NDHR30	12	control valve	A1001-141N
	condenser set (300610)	SC100-NDHR40	13	fan pressure switch	A0802-066N
3	fan motor	A0601-033N	14	filter	A1001-090N
4	control card	C0104-220N	15	e. box assembly	*
5	pressure gauge	A1102-040N	16	right panel	*
6	compressor	A0101-043N	17	solenoid valve	A0904-088N
7	front panel	*		dew point sensor	C0104-221N
8	left panel	*		y-strainer	A2001-028N
9	top panel	*			

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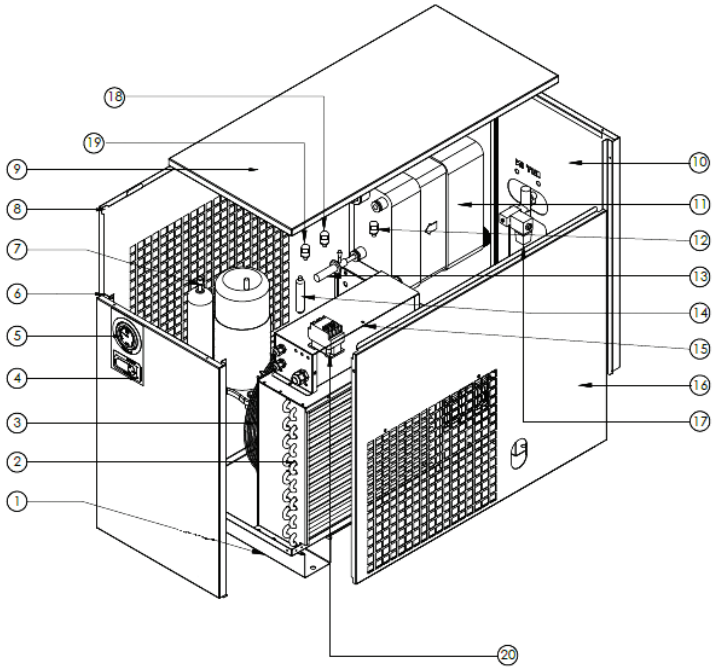
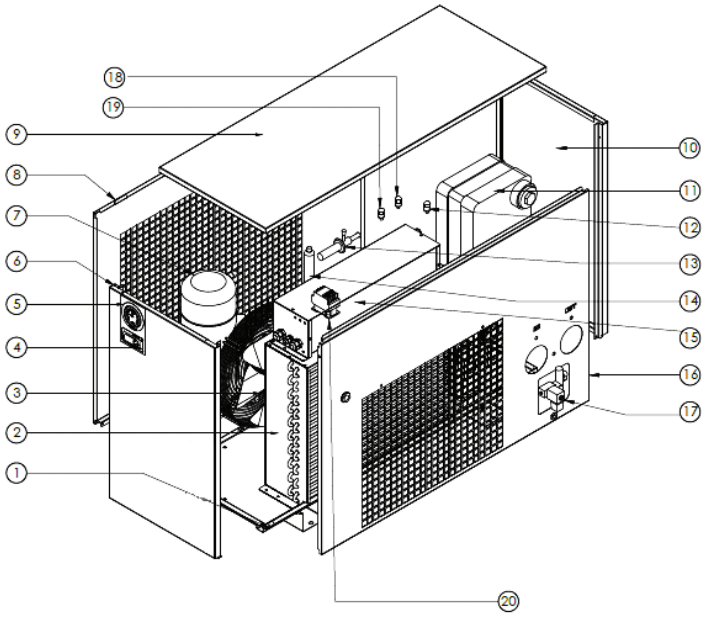
300611 to 300612 - 230/1/60



no	description	part no	no	description	part no
1	bottom base assembly	*	12	fan pressure switch	A0802-054N
2	condenser set (300611)	SC100-NDHR50	13	control valve	A1001-140N
	condenser (300612)	SC100-NDHR60	14	filter	A1001-090N
3	fan motor	A0702-044N	15	e. box assembly	*
4	control card	C0104-144N	16	right panel	*
5	pressure gauge	A1102-040N	17	solenoid valve	A0904-089N
6	front panel	*	18	high pressure switch	A0802-053N
7	compressor	*	19	low pressure switch	A0802-061N
8	left panel	*	20	compressor contactor	C0108-007N
9	top panel	*		dew point sensor	C0104-143N
10	back panel	*		y-strainer	A2001-028N
11	evaporator unit	A1601-215N			

300184 - 230/1/60



no	description	part no	no	description	part no
1	bottom base assembly	*	12	fan pressure switch	A0802-054N
2	condenser set	SC100-NDHR75	13	control valve	A1001-141N
3	fan motor	A0702-044N	14	filter	A1001-090N
4	control card	C0104-144N	15	e. box assembly	*
5	pressure gauge	A1102-040N	16	right panel	*
6	front panel	*	17	solenoid valve	A0904-089N
7	compressor	A0101-049N	18	high pressure switch	A0802-053N
8	left panel	*	19	low pressure switch	A0802-061N
9	top panel	*	20	compressor contactor	C0108-007N
10	back panel	*		dew point sensor	C0104-144N
11	evaporator unit	A1601-207N		y-strainer	A2001-028N

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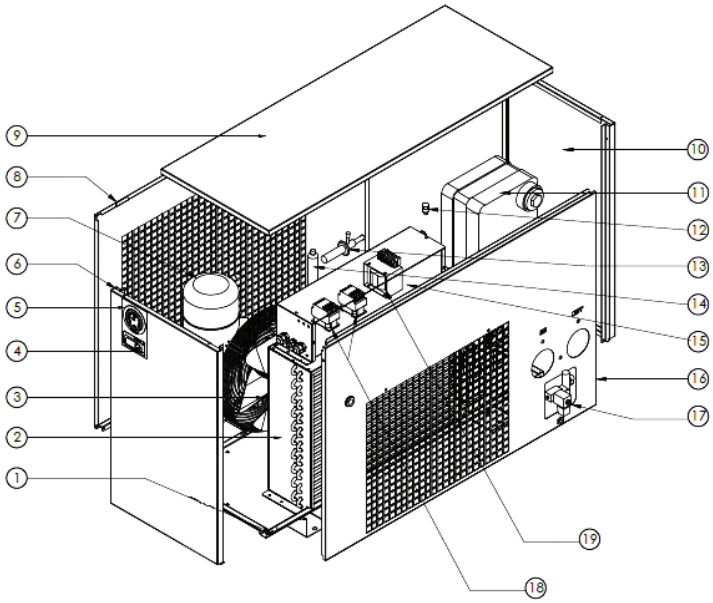
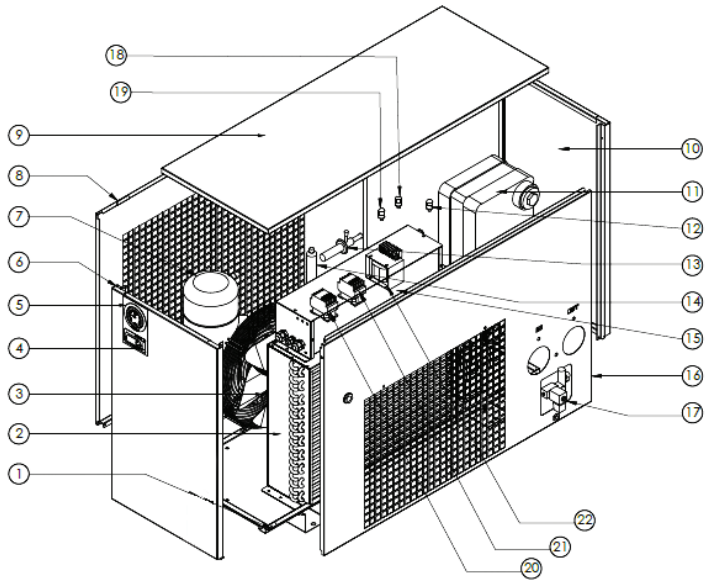
300184 - 460V/3/60



no	description	part no	no	description	part no
1	bottom base assembly	*	12	fan pressure switch	A0802-055N
2	condenser set	SC100-NDHR75	13	control valve	A1001-143N
3	fan motor	A0601-045N	14	filter	A1001-090N
4	control card	C0104-144N	15	e. box assembly	*
5	pressure gauge	A1102-040N	16	right panel	*
6	front panel	*	17	solenoid valve	A0904-089N
7	compressor	A0101-046N	18	compressor contactor	C0108-027N
8	left panel	*	19	transformer	C0109-031N
9	top panel	*		dew point sensor	C0104-143N
10	back panel	*		y-strainer	A2001-028N
11	evaporator unit	A1601-207N			

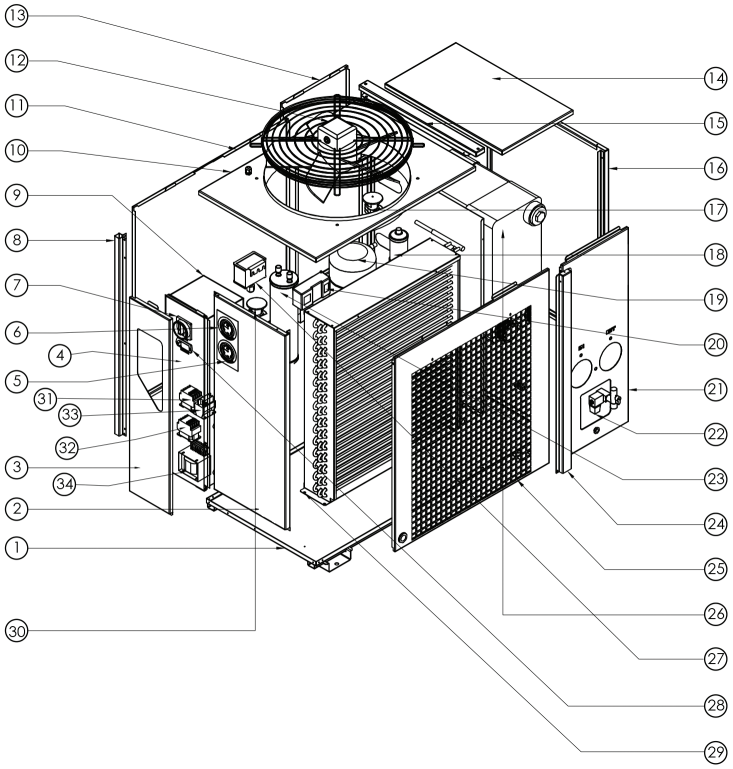
100618 to 103438



no	description	part no	no	description	part no
1	bottom base assembly	*	12	fan pressure switch	A0802-208N
2	condenser set (100618)	SC100-NDHR100	13	control valve	A1001-143N
	condenser set (300613)	SC100-NDHR125	14	filter	A1001-008N
	condenser set (103438)	SC100-NDHR150	15	e. box assembly	*
3	fan motor	A0702-045N	16	right panel	*
4	control card	C0104-144N	17	solenoid valve	A0904-089N
5	pressure gauge	A1102-040N	18	high pressure switch	A0802-053N
6	front panel	*	19	low pressure switch	A0802-061N
7	compressor	A0101-046N	20	compressor contactor	C0108-215N
8	left panel	*	21	fan contactor	C0108-027N
9	top panel	*	22	transformer	C0109-031N
10	back panel	*		dew point sensor	C0104-143N
11	evaporator unit	A1601-208N		y-strainer	A2001-028N

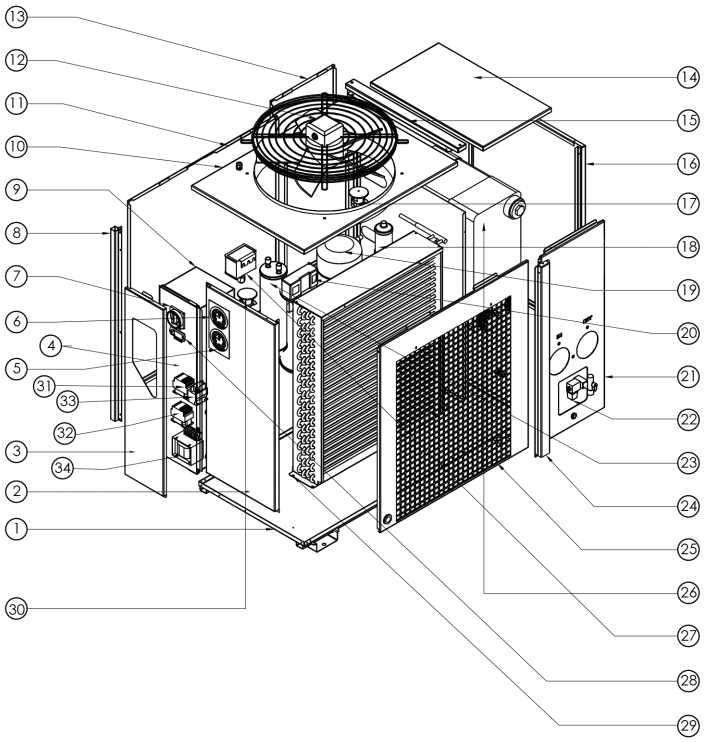
direct expansion refrigerated air dryer

300614



no	description	part no	no	description	part no
1	bottom base assembly	*	19	compressor	A0101-047N
2	front panel	*	20	H/L pressure switch	A0802-027N
3	service panel #1	*	21	right panel #2	*
4	service panel #2	*	22	solenoid valve	A0904-089N
5	low pressure gauge	A1102-040N	23	oil separator	A1402-010N
6	high pressure gauge	A1102-041N	24	column middle	*
7	change switch	C0104-229N	25	right panel #1	*
8	column front left	*	26	evaporator unit	A1601-223N
9	e. box assembly	*	27	fan pressure switch	A0802-028N
10	top panel #1	*	28	control card	C0104-144N
11	left panel #1	*	29	condenser set	SC100-NDHR200
12	fan motor	A702-046N	30	hot gas bypass	A1001-144n
13	left panel #2	*	31	compressor contactor	C0108-215N-CTA
14	top panel #2	*	32	fan contactor	C0108-027N
15	column top	*	33	overload	C0108-233N
16	back panel	*	34	transformer	C0109-031N
17	constant valve	A1001-144N		y-strainer	A2001-028N
18	filter	A1001-020N		sensor	C0104-143N

300188



no	description	part no	no	description	part no
1	bottom base assembly	*	19	compressor	A0101-048N
2	front panel	*	20	H/L pressure switch	A0802-027N
3	service panel #1	*	21	right panel #2	*
4	service panel #2	*	22	solenoid valve	A0904-089N
5	low pressure gauge	A1102-040N	23	oil separator	A1402-010N
6	high pressure gauge	A1102-041N	24	column middle	*
7	change switch	C104-229N	25	right panel #1	*
8	column front left	*	26	evaporator unit	A1601-224N
9	e. box assembly	*	27	fan pressure switch	A0802-028N
10	top panel #1	*	28	control card	C0104-144N
11	left panel #1	*	29	condenser set	SC100-NDHR250
12	fan motor	A0702-046N	30	hot gas bypass	A1001-144N
13	left panel #2	*	31	compressor contactor	C0108-215N-CTA
14	top panel #2	*	32	fan contactor	C0108-027N
15	column top	*	33	overload	C0108-234N
16	back panel	*	34	transformer	C0109-031N
17	constant valve	A1001-144N		y-strainer	A2001-028N
18	filter	A1001-089N		sensor	C0104-143N

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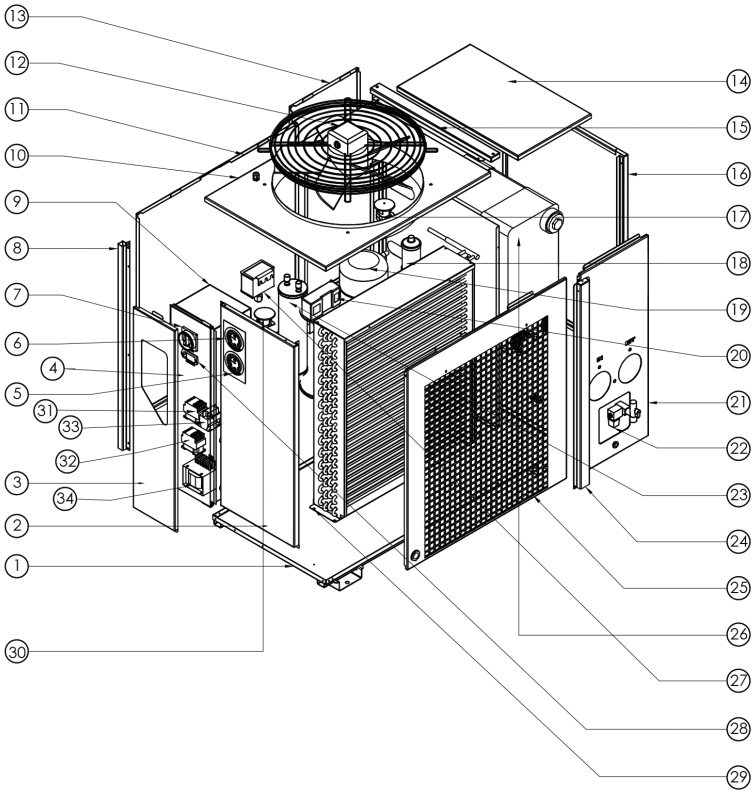
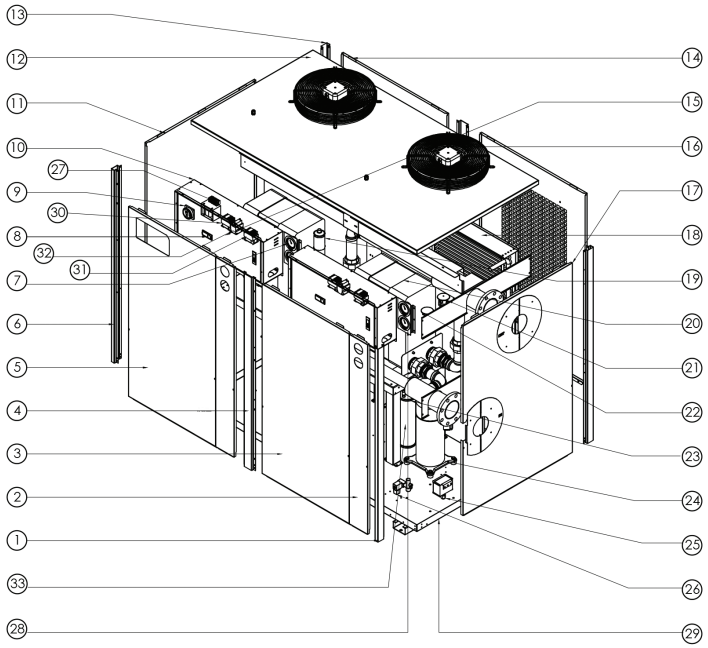
300615



no	description	part no	no	description	part no
1	bottom base assembly	*	19	compressor	A0101-049N
2	front panel	*	20	H/L pressure switch	A0802-027N
3	service panel #1	*	21	right panel #2	*
4	service panel #2	*	22	solenoid valve	A0904-089N
5	low pressure gauge	A1102-040N	23	oil separator	A1402-010N
6	high pressure gauge	A1102-041N	24	column middle	*
7	change switch	C0104-229N	25	right panel #1	*
8	column front left	*	26	evaporator unit	A1601-190N
9	e. box assembly	*	27	fan pressure switch	A0802-028N
10	top panel #1	*	28	control card	C0104-144N
11	left panel #1	*	29	condenser set	SC100-NDHR300
12	fan motor	A0702-046N	30	hot gas bypass	A1001-144N
13	left panel #2	*	31	compressor contactor	C0108-215N-CTA
14	top panel #2	*	32	fan contactor	C0108-027N
15	column top	*	33	overload	C0108-235N
16	back panel	*	34	transformer	C0109-031N
17	constant valve	A1001-144N		y-strainer	A2001-028N
18	filter	A1001-089N		sensor	C0104-143N

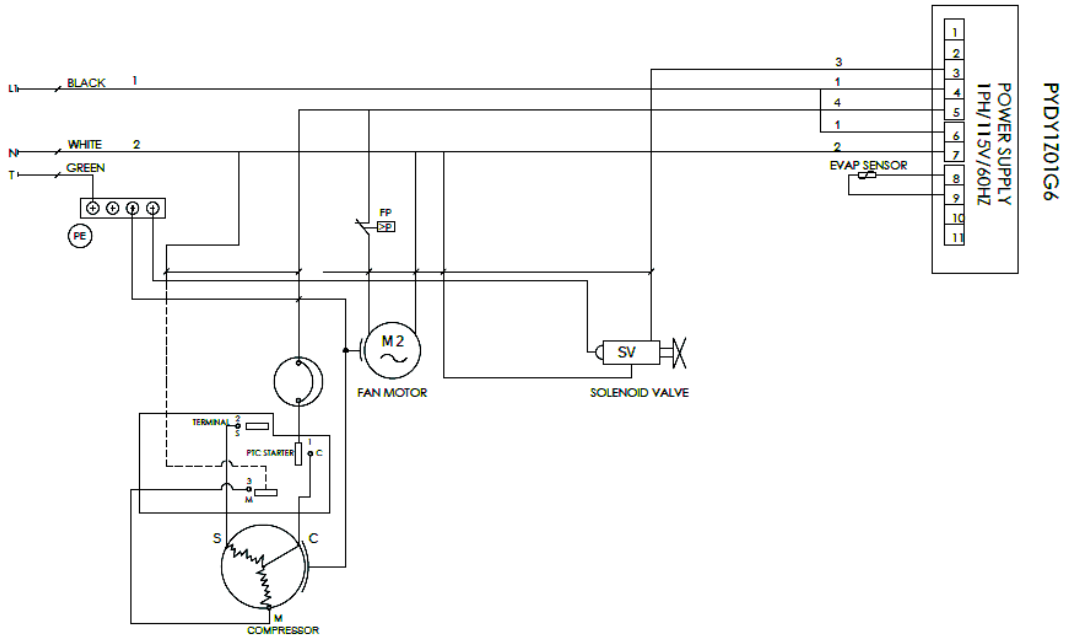
300616



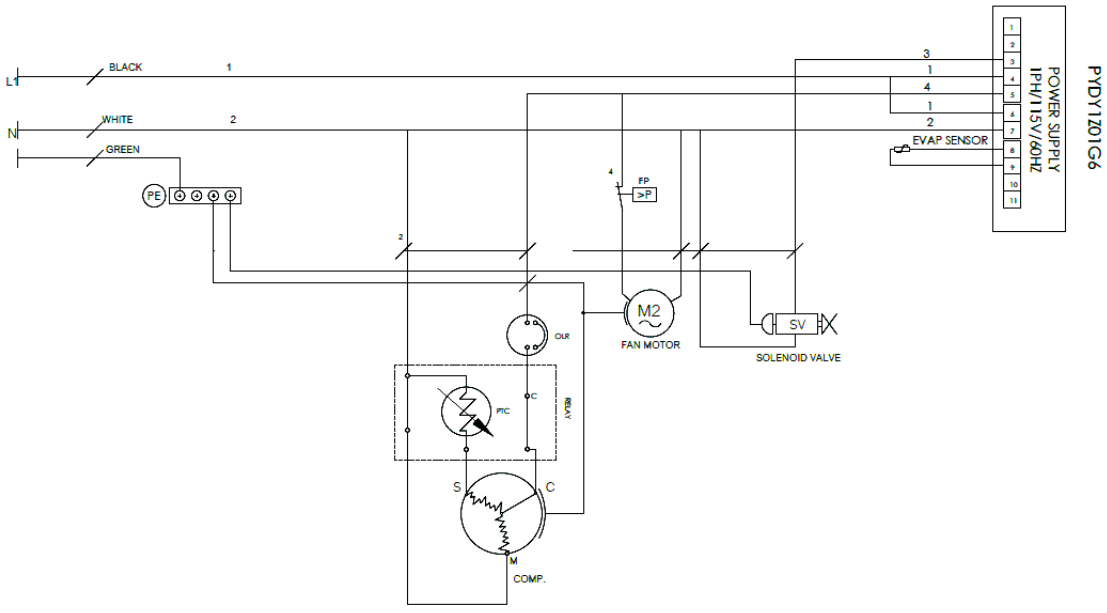
no	description	part no	no	description	part no
1	column front right	*	19	filter	A1001-020N
2	service panel #1	*	20	evaporator	A1601-223N
3	front panel r	*	21	constant valve	A1001-144N
4	column middle	*	22	hot gas bypass	A1001-144N
5	front panel l	*	23	solenoid valve	A0904-089N
6	column front left	*	24	compressor	A0101-047N
7	high pressure gauge	A1102-041N	25	fan pressure switch	A0802-028N
8	control card	C0104-144N	26	h/l pressure switch	A0802-027N
9	switch on/off	C0104-229N	27	transformer	C0109-031N
10	e box assembly	*	28	low pressure gauge	A1102-040N
11	left panel	*	29	bottom base assembly	*
12	top panel	*	30	compressor magnetic	C0108-215N-CTA
13	column back l	*	31	fan magnetic	C0108-027N
14	back panel r-l	*	32	overload	C0108-233N
15	service panel #2	*	33	oil separator	A1402-010N
16	fan motor	A0702-046N		y-strainer	A2001-028N
17	right panel	*		sensor	C0104-143N
18	condenser set	SC100-NDHR400			

3.3 electrical wirings

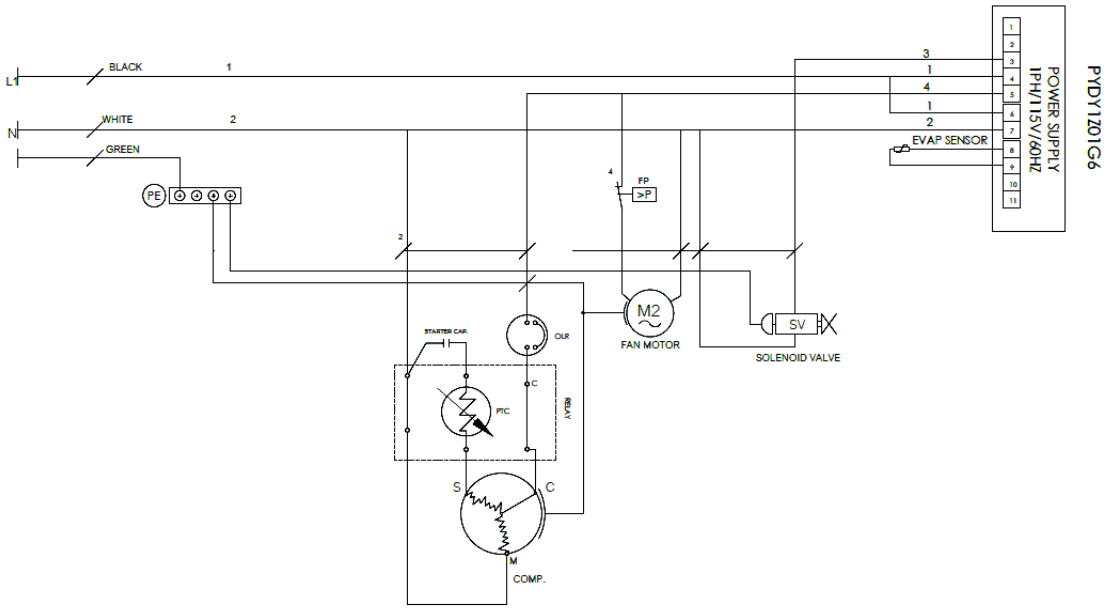
103466 to 300607 - 115V/1/60



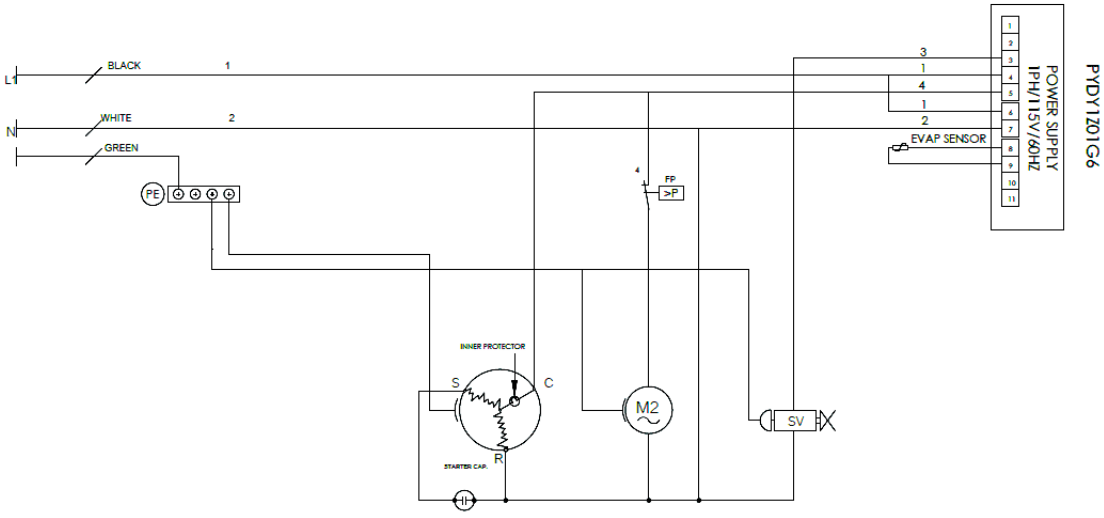
900001 to 300608 - 115V/1/60Hz



300609 to 997034 - 115V/1/60

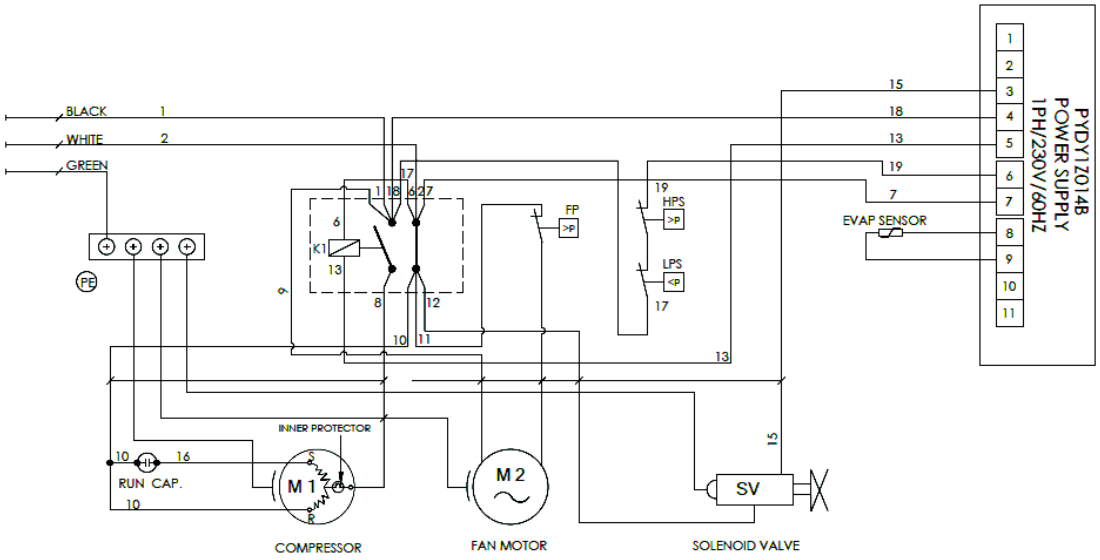


103548 to 300610 - 115V/1/60Hz

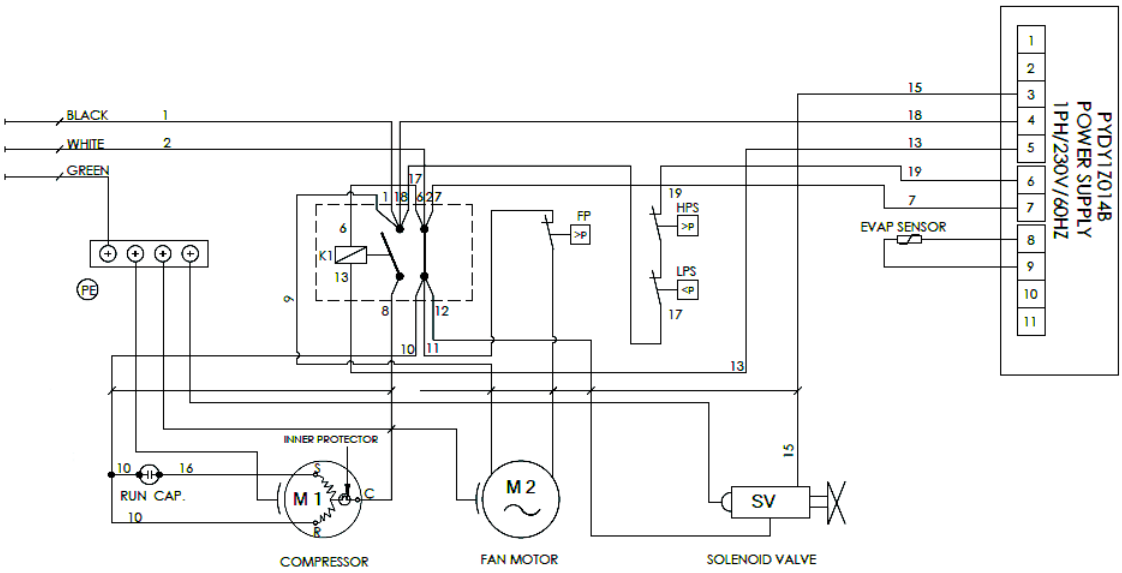


direct expansion refrigerated air dryer

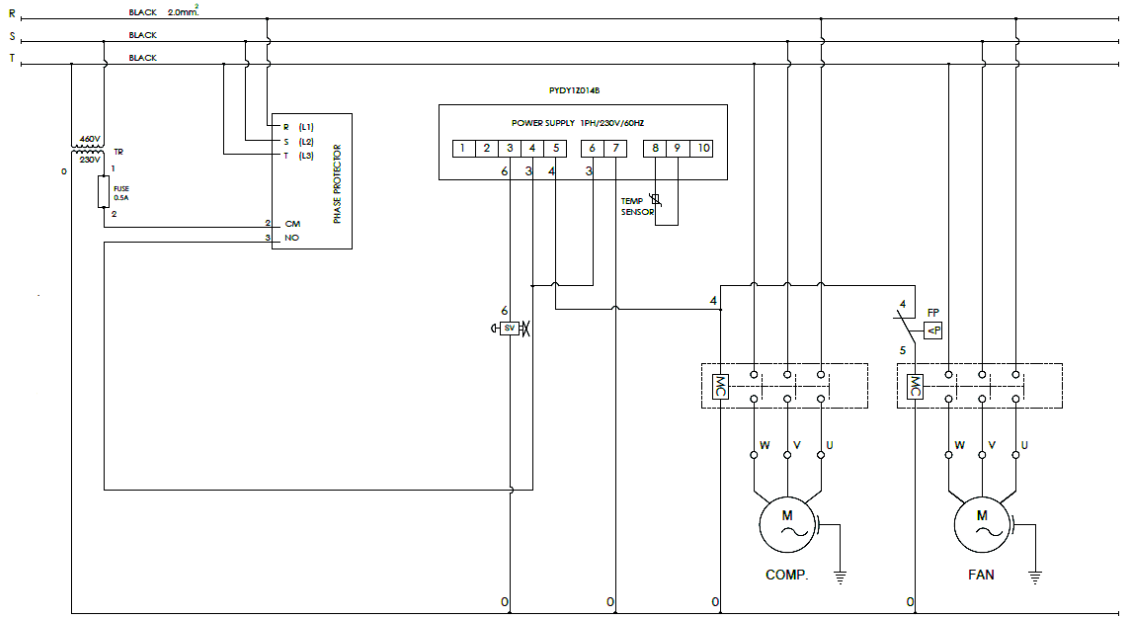
300611 to 300612 - 230V/1/60



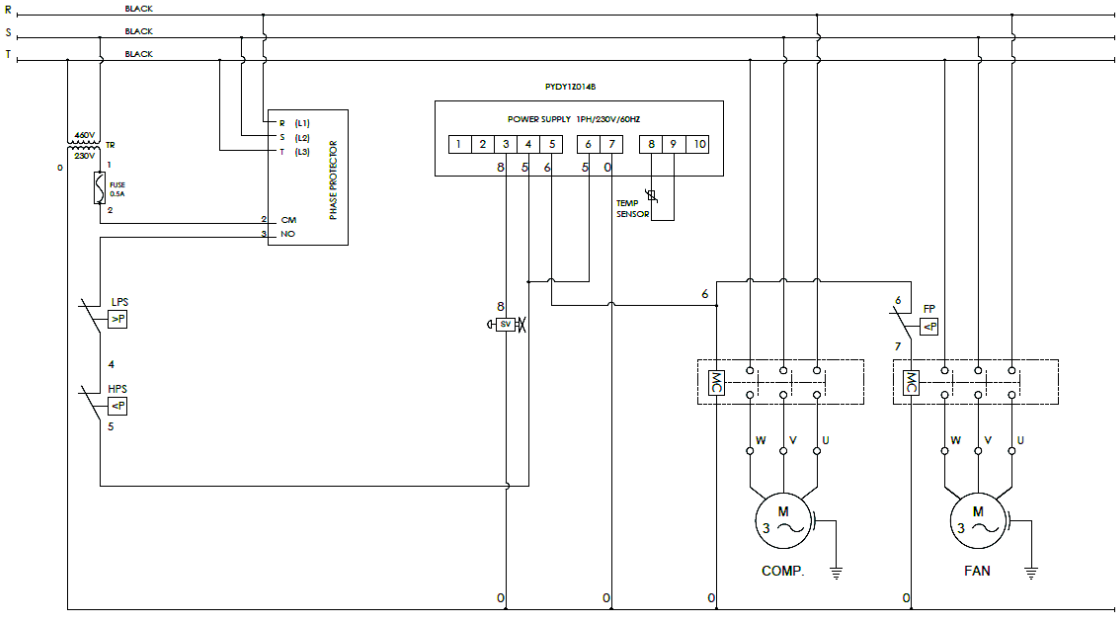
300184 - 230V/1/60Hz



300612 - 300184 - 460V/3/60Hz

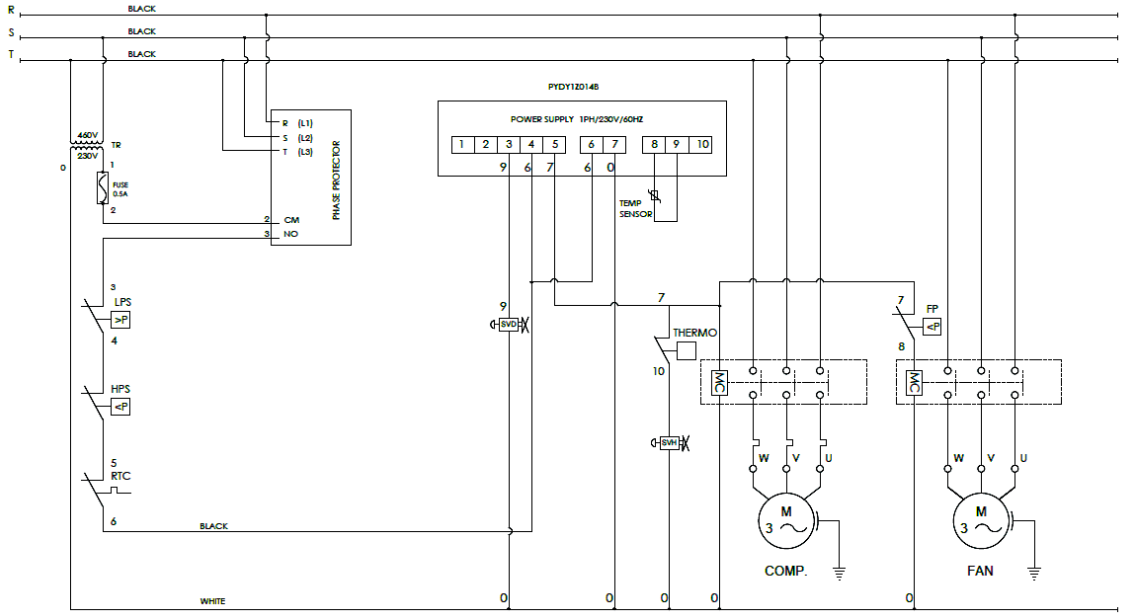


100618 - 300613 - 103438 - 460V/3/60Hz

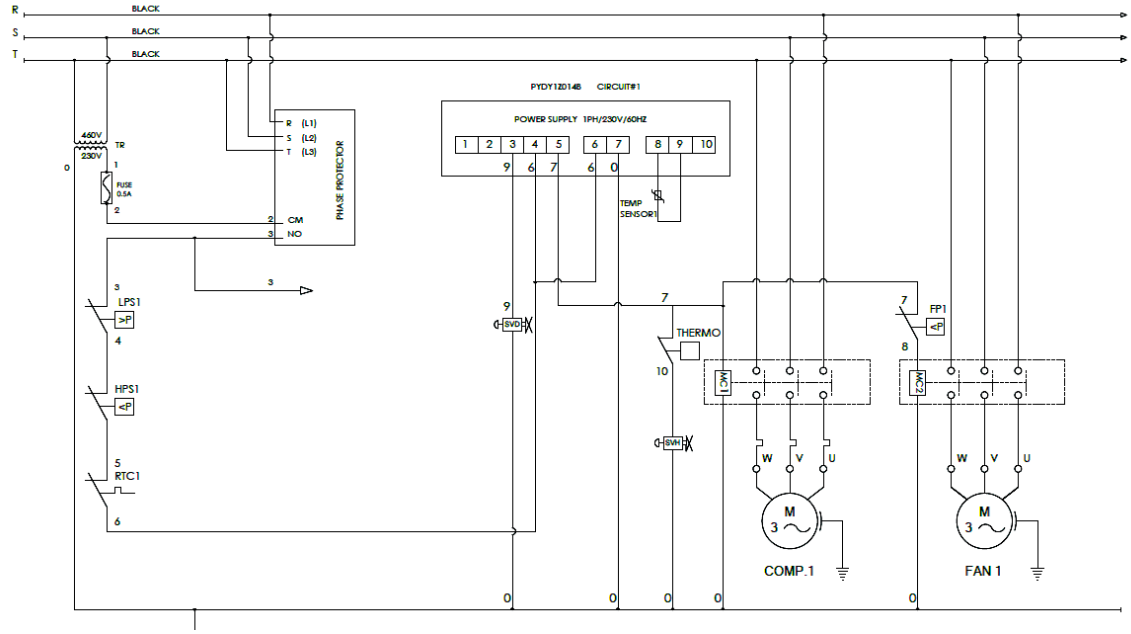


direct expansion refrigerated air dryer

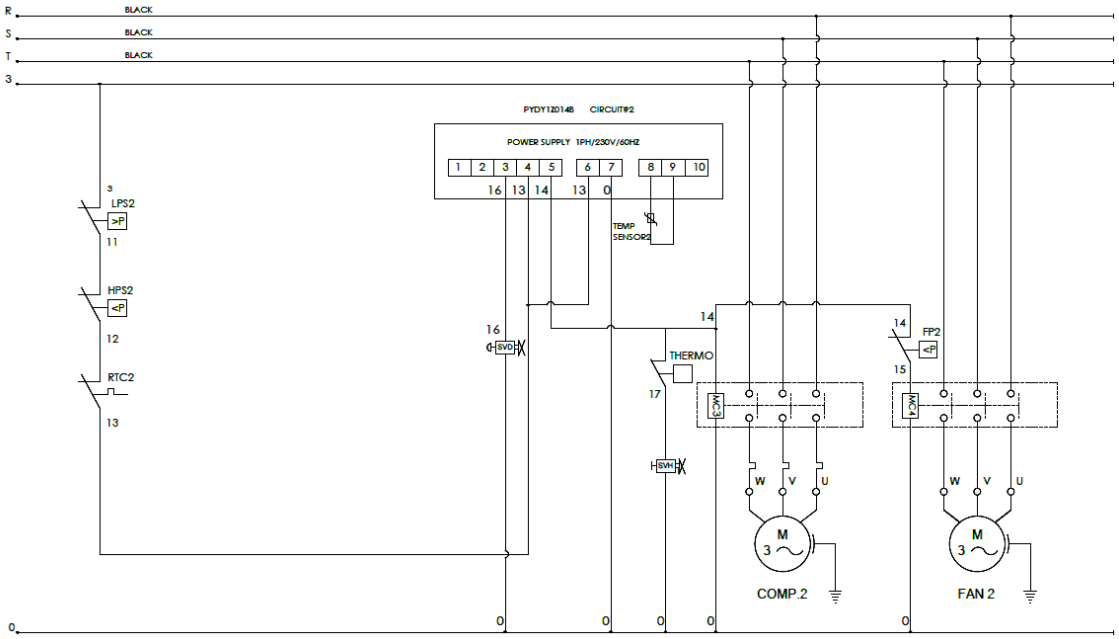
300614 - 300188 - 300615 - 460V/3/60Hz



300616 - 300617 - 460V/3/60Hz (1st Circuit)



300616 - 300617 - 460V/3/60Hz (2nd Circuit)



direct expansion refrigerated air dryer

3.4 appendixes

reference	power supply	max power installed	full load amps	air connections/ pressure		refrigerant gas	weight
model	60 Hz only	(kW)	(A)	NPT (inch)	max working pressure (psi)	HFC	lbs
103466	1/115V/60Hz	0.29	3.66	½"	232	R134a	55
300607	1/115V/60Hz	0.30	3.80	½"	232	R134a	62
900001	1/115V/60Hz	0.31	3.85	½"	232	R134a	71
300608	1/115V/60Hz	0.33	4.00	½"	232	R134a	77
300609	1/115V/60Hz	0.61	7.86	¾"	232	R134a	84
997034	1/115V/60Hz	0.64	8.20	¾"	232	R134a	93
103548	1/115V/60Hz	1.15	10.70	1"	232	R134a	143
300180	1/115V/60Hz	1.19	11.10	1"	232	R134a	143
300610	1/115V/60Hz	1.25	11.57	1 ½"	232	R134a	152
300611	1/230V/60Hz	1.22	7.50	1 ½"	232	R407c	196
300612	1/230V/60Hz	1.39	12.40	1 ½"	232	R407c	223
300612	3/460V/60Hz	1.91	4.82	2"	232	R134a	223
300184	1/230V/60Hz	2.20	11.19	2"	232	R407c	254
300184	3/460V/60Hz	1.91	4.82	2"	232	R134a	256
100618	3/460V/60Hz	3.25	6.06	2"	232	R407c	298
300613	3/460V/60Hz	3.38	6.31	2 ½"	232	R407c	320
103438	3/460V/60Hz	4.50	7.92	2 ½"	232	R407c	397
300614	3/460V/60Hz	4.68	8.24	2 ½"	189	R407c	712
300188	3/460V/60Hz	6.55	11.35	3"	189	R407c	772
300615	3/460V/60Hz	8.50	14.90	3"	189	R407c	882
300616	3/460V/60Hz	8.79	15.50	4" Flg	189	R407c	1433
300617	3/460V/60Hz	9.36	16.48	4" Flg	189	R407c	1433

4.1 R407c gas chemical safety data sheet

PRODUCT NAME: REFRIGERANT GAS R407c

COMPOSITION/INFORMATION ON INGREDIENTS

EEC No.: 200-839-4 HFC32, 206-557-8 HFC125, 212-377-0 HFC134a

HAZARDOUS INGREDIENT(S)	CAS No.	% (w/w)	Symbol	R Phrases
Difluoromethane (HFC 32)	000075-10-5	23	F+	R12
Pentafluoroethane (HFC 125)	000354-33-6	25		
1,1,1,2-tetrafluoroethane (HFC 134a)	000811-97-2	52		

HAZARDS IDENTIFICATION

Low acute toxicity. High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.
Liquid splashes or spray may cause freeze burns to skin and eyes.

FIRST-AID MEASURES

The first aid advice given for skin contact, eye contact, and ingestion is applicable following exposures to the liquid or spray. See also TOXICOLOGICAL INFORMATION.

Inhalation: Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. In the event of cardiac arrest apply external cardiac massage. Obtain immediate medical attention.

Skin Contact: Thaw affected areas with water. Remove contaminated clothing. Caution: clothing may adhere to the skin in the case of freeze burns. After contact with skin, wash immediately with plenty of warm water. If irritation or blistering occur obtain medical attention.

Eye Contact: Immediately irrigate with eyewash solution or clean water, holding the eyelids apart, for at least 10 minutes. Obtain immediate medical attention.

Ingestion: Unlikely route of exposure.
Do not induce vomiting. Provided the patient is conscious, wash out mouth with water and give 200-300 ml (half a pint) of water to drink. Obtain immediate medical attention.

Further Medical Treatment

Symptomatic treatment and supportive therapy as indicated.
Adrenaline and similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest.

FIRE-FIGHTING MEASURES
This refrigerant is not flammable in air under ambient conditions of temperature and pressure. Certain mixtures of this refrigerant and air when under pressure may be flammable. Mixtures of this refrigerant and air under pressure should be avoided.
Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.
Thermal decomposition will evolve very toxic and corrosive vapors. (hydrogen fluoride)
Containers may burst if overheated.

Extinguishing Media: As appropriate for surrounding fire. Water spray should be used to cool containers.

Fire Fighting Protective Equipment: A self contained breathing apparatus and full protective clothing must be worn in fire conditions. See Also EXPOSURE CONTROLS/ PERSONAL PROTECTION.

ACCIDENTAL RELEASE MEASURES
Ensure suitable personal protection (including respiratory protection) during removal of spillages. See Also **EXPOSURE CONTROLS/PERSONAL PROTECTION.**
Provided it is safe to do so, isolate the source of the leak. Allow small spillages to evaporate provided there is adequate ventilation.
Large spillages: Ventilate area. Contain spillages with sand, earth or any suitable adsorbent material. Prevent liquid from entering drains, sewers, basements and workpits since the vapor may create a suffocating atmosphere.

HANDLING AND STORAGE

HANDLING
Avoid inhalation of high concentrations of vapors. Atmospheric levels should be controlled in compliance with the occupational exposure limit. Atmospheric concentrations well below the occupational exposure limit can be achieved by good occupational hygiene practice.
The vapor is heavier than air, high concentrations may be produced at low levels where general ventilation is poor, in such cases provide adequate ventilation or wear suitable respiratory protective equipment with positive air supply.
Avoid contact with naked flames and hot surfaces as corrosive and very toxic decomposition products can be formed.
Avoid contact between the liquid and skin and eyes.
For correct refrigerant composition, systems should be charged using the liquid phase and not the vapor phase.

Process Hazards
Liquid refrigerant transfers between refrigerant containers and to and from systems can result in static generation. Ensure adequate earthing. Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.
Keep container dry.
Storage temperature (Deg C): < 45

STORAGE
Keep in a well ventilated place. Keep in a cool place away from fire risk, direct sunlight and all sources of heat such as electric and steam radiators.
Avoid storing near to the intake of air conditioning units, boiler units and open drains.
Cylinders and Drums:
Keep container dry.
Storage temperature (Deg C): < 45

EXPOSURE CONTROLS/PERSONAL PROTECTION
Wear suitable protective clothing, gloves and eye/face protection. Wear thermal insulating gloves when handling liquefied gases.
In cases of insufficient ventilation, where exposure to high concentrations of vapor is possible, suitable respiratory protective equipment with positive air supply should be used.

Occupational Exposure Limits

HAZARDOUS INGREDIENT(S)	**TWA ppm**	**TWA mg/m³**	**STEL ppm**	**STEL mg/m³**	
Difluoromethane (HFC 32)	1000	-	-	-	COM
Pentafluoroethane (HFC 125)	1000	-	-	-	COM
1,1,1,2- Tetrafluoroethane (HFC 134a)	1000	4240	-	-	OES

PHYSICAL AND CHEMICAL PROPERTIES

Form:	liquified gas
Color:	colorless
Odor:	slight ethereal
Boiling Point (Deg C):	-44.3 to -37.1 (boiling range)
Vapor Pressure (mm Hg):	7810 at 20 Deg C
Density (g/ml):	1.16 at 20 Deg C
Solubility (Water):	insoluble
Solubility (Other): soluble in:	chlorinated solvents, alcohols, esters
Vapor Density (Air= 1):	3.0 at bubble point temperature

STABILITY AND REACTIVITY

Hazardous Reactions:	Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.
Incompatible materials:	finely divided metals, magnesium and alloys containing more than 2% magnesium. Can react violently if in contact with alkali metals and alkaline earth metals -sodium, potassium, barium.
Hazardous Decomposition Product(s):	hydrogen fluoride by thermal decomposition and hydrolysis.

TOXICOLOGICAL INFORMATION
Inhalation
High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.

Skin Contact
Liquid splashes or spray may cause freeze burns. Unlikely to be hazardous by skin absorption
.
Eye Contact
Liquid splashes or spray may cause freeze burns.

Ingestion
Highly unlikely - but should this occur freeze burns will result.

Long Term Exposure

HFC 32: An inhalation study in animals has shown that repeated exposures produce no significant effects (49,500ppm in rats).

HFC 125: An inhalation study in animals has shown that repeated exposures produce no significant effects (50,000ppm in rats).

HFC 134a: A lifetime inhalation study in rats has shown that exposure to 50,000ppm resulted in benign tumors of the testis. The increased tumor incidence was observed only after prolonged exposure to high levels, and is considered not to be of relevance to humans occupationally exposed to HFC 134a at or below the occupational exposure limit.

ECOLOGICAL INFORMATION
Environmental Fate and Distribution
High tonnage material produced in wholly contained systems. High tonnage material used in open systems. Vapor.

Persistence and Degradation
HFC 32: Decomposed comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 5.6 year(s). Has a Halocarbon Global Warming Potential (HGWP) of 0.15 (relative to a value of 1 for CFC 11) or a Global Warming Potential (GWP) of 650 (relative to a value of 1 for carbon dioxide at 100 years).

HFC 125: Decomposed slowly in the lower atmosphere (troposphere). Atmospheric lifetime is 32.6 year(s). Has a Halocarbon Global Warming Potential (HGWP) of 0.70 (relative to a value of 1 for CFC 11) or a Global Warming Potential (GWP) of 2800 (relative to a value of 1 for carbon dioxide at 100 years).

HFC 134a: Decomposed comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 13.6 year(s). Has a Halocarbon Global Warming Potential (HGWP) of 0.30 (relative to a value of 1 for CFC 11) or a Global Warming Potential (GWP) of 1300 (relative to a value of 1 for carbon dioxide at 100 years).

HFC 32, HFC 125, HFC 134a: Do not influence photochemical smog (i.e. they are not VOCs under the terms of the UNECE agreement). Do not deplete ozone.

Effect on Effluent Treatment
Discharges of the product will enter the atmosphere and will not result in long term aqueous contamination.

DISPOSAL CONSIDERATIONS
Best to recover and recycle. If this is not possible, destruction is to be in an approved facility which is equipped to absorb and neutralise acid gases and other toxic processing products.

TRANSPORT INFORMATION

UN No.:	3340
AIR	
ICAO/IATA	
-primary:	2.2
SEA	
IMDG	
-primary:	2.2
Marine Pollutant:	Not classified as a Marine Pollutant
Proper Shipping Name:	REFRIGERANT GAS R 407C
ROAD/RAIL	
ADR/RID Class:	2
ADR/RID Item No:	2A
ADR Sin:	3340

REGULATORY INFORMATION
Not Classified as Hazardous to Users.

GLOSSARY

OES:	Occupational Exposure Standard (UK HSE EH40)
MEL:	Maximum Exposure Limit (UK HSE EH40)
COM:	The company aims to control exposure in its workplace to this limit
TLV:	The company aims to control exposure in its workplace to the ACGIH limit
TLV-C:	The company aims to control exposure in its workplace to the ACGIH Ceiling limit
MAK:	The company aims to control exposure in its workplace to the German limit
Sk:	Can be absorbed through skin
Sen:	Capable of causing respiratory sensitization
Bmgv:	Biological monitoring guidance value (UK HSE EH40)
ILV:	Indicative Limit Value (UK HSE EH40)

4.2 R134a gas chemical safety data sheet

PRODUCT NAME: REFRIGERANT GAS R134a

COMPOSITION/INFORMATION ON INGREDIENTS
CAS No.: 000811-97-2
EEC No.: 212-377-0

HAZARDOUS INGREDIENT(S) CAS No. Symbol R Phrases
1,1,1,2-tetrafluoroethane (HFC 134a) 000811-97-2

HAZARDS IDENTIFICATION
Low acute toxicity. High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.
Liquid splashes or spray may cause freeze burns to skin and eyes.

FIRST-AID MEASURES
The first aid advice given for skin contact, eye contact, and ingestion is applicable following exposures to the liquid or spray. See also TOXICOLOGICAL INFORMATION.
Inhalation: Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. In the event of cardiac arrest apply external cardiac massage. Obtain immediate medical attention.

Skin Contact: Thaw affected areas with water. Remove contaminated clothing. Caution: clothing may adhere to the skin in the case of freeze burns. After contact with skin, wash immediately with plenty of warm water. If irritation or blistering occur obtain medical attention.

Eye Contact: Immediately irrigate with eyewash solution or clean water, holding the eyelids apart, for at least 10 minutes.
Obtain immediate medical attention.

Ingestion: Unlikely route of exposure.
Do not induce vomiting. Provided the patient is conscious, wash out mouth with water and give 200-300 ml (half a pint) of water to drink. Obtain immediate medical attention.

Further Medical Treatment
Symptomatic treatment and supportive therapy as indicated.
Adrenaline and similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest.

FIRE-FIGHTING MEASURES
This refrigerant is not flammable in air under ambient conditions of temperature and pressure. Certain mixtures of this refrigerant and air when under pressure may be flammable. Mixtures of this refrigerant and air under pressure should be avoided.
Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions. Thermal decomposition will evolve very toxic and corrosive vapors. (hydrogen fluoride)
Contains may burst if overheated.

Extinguishing Media: As appropriate for surrounding fire. Water spray should be used to cool containers.

FIre FIghting Protective Equipment: A self-contained breathing apparatus and full protective clothing must be worn in fire conditions. See Also EXPOSURE CONTROLS/ PERSONAL PROTECTION.

ACCIDENTAL RELEASE MEASURES
Ensure suitable personal protection (including respiratory protection) during removal of spillages. See Also EXPOSURE CONTROLS/PERSONAL PROTECTION.

Provided it is safe to do so, isolate the source of the leak. Allow small spillages to evaporate provided there is adequate ventilation.
Large spillages: Ventilate area. Contain spillages with sand, earth or any suitable adsorbent material. Prevent liquid from entering drains, sewers, basements and workpits since the vapor may create a suffocating atmosphere.

HANDLING AND STORAGE

HANDLING
Avoid inhalation of high concentrations of vapors. Atmospheric levels should be controlled in compliance with the occupational exposure limit. Atmospheric concentrations well below the occupational exposure limit can be achieved by good occupational hygiene practice.
The vapor is heavier than air, high concentrations may be produced at low levels where general ventilation is poor, in such cases provide adequate ventilation or wear suitable respiratory protective equipment with positive air supply.
Avoid contact with naked flames and hot surfaces as corrosive and very toxic decomposition products can be formed.
Avoid contact between the liquid and skin and eyes.
For correct refrigerant composition, systems should be charged using the liquid phase and not the vapor phase.

STORAGE
Keep in a well ventilated place. Keep in a cool place away from fire risk, direct sunlight and all sources of heat such as electric and steam radiators.
Avoid storing near to the intake of air conditioning units, boiler units and open drains.
Cylinders and Drums:
Keep container dry.
Storage temperature (Deg C): < 45

EXPOSURE CONTROLS/PERSONAL PROTECTION
Wear suitable protective clothing, gloves and eye/face protection. Wear thermal insulating gloves when handling liquefied gases.
In cases of insufficient ventilation, where exposure to high concentrations of vapor is possible, suitable respiratory protective equipment with positive air supply should be used.

Occupational Exposure Limits

HAZARDOUS INGREDIENT(S)	TWA ppm	TWA mg/m3	STEL ppm	STEL mg/m3	
1,1,1,2- Tetrafluoroethane (HFC 134a)	1000	4240	-	-	OES

PHYSICAL AND CHEMICAL PROPERTIES

Form:	liquified gas
Color:	colorless
Odor:	slight ethereal
Boiling Point (Deg C):	-26.2
Vapor Pressure (mm Hg):	4270 at 20 Deg C
Density (g/ml):	1.22 at 20 Deg C
Solubility (Water):	insoluble
Solubility (Other): soluble in:	chlorinated solvents, alcohols, esters
Vapor Density (Air= 1):	3.66 at bubble point temperature

STABILITY AND REACTIVITY

Hazardous Reactions:	Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.
Incompatible materials:	finely divided metals, magnesium and alloys containing more than 2% magnesium. Can react violently if in contact with alkali metals and alkaline earth metals -sodium, potassium, barium.
Hazardous Decomposition Product(s):	hydrogen fluoride by thermal decomposition and hydrolysis.

TOXICOLOGICAL INFORMATION

Inhalation

High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.

Skin Contact

Liquid splashes or spray may cause freeze burns. Unlikely to be hazardous by skin absorption.

Eye Contact

Liquid splashes or spray may cause freeze burns.

Ingestion

Highly unlikely - but should this occur freeze burns will result.

Long Term Exposure

A lifetime inhalation study in rats has shown that exposure to 50,000ppm resulted in benign tumors of the testis. The increased tumor incidence was observed only after prolonged exposure to high levels, and is considered not to be of relevance to humans occupationally exposed to HFC 134a at or below the occupational exposure limit.

ECOLOGICAL INFORMATION
Environmental Fate and Distribution
High tonnage material produced in wholly contained systems. High tonnage material used in open systems.

Vapor.Persistence and Degradation
Decomposed comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 13.6 year(s). Has a Halocarbon Global Warming Potential (HGWP) of 0.30 (relative to a value of 1 for CFC 11) or a Global Warming Potential (GWP) of 1300 (relative to a value of 1 for carbon dioxide at 100 years).

Effect on Effluent Treatment
Discharges of the product will enter the atmosphere and will not result in long term aqueous contamination.

DISPOSAL CONSIDERATIONS
Best to recover and recycle. If this is not possible, destruction is to be in an approved facility which is equipped to absorb and neutralise acid gases and other toxic processing products.

TRANSPORT INFORMATION

UN No.:	3159
AIR	
ICAO/IATA	
-primary:	2.2
SEA	
IMDG	
-primary:	2.2
Marine Pollutant:	Not classified as a Marine Pollutant
Proper Shipping Name:	1,1,1,2-TETRAFLUOROETHANE
ROAD/RAIL	
ADR/RID Class:	2
ADR/RID Item No:	2A
ADR Sin:	3159

REGULATORY INFORMATION
Not Classified as Hazardous to Users.

GLOSSARY

OES:	Occupational Exposure Standard (UK HSE EH40)
MEL:	Maximum Exposure Limit (UK HSE EH40)
COM:	The company aims to control exposure in its workplace to this limit
TLV:	The company aims to control exposure in its workplace to the ACGIH limit
TLV-C:	The company aims to control exposure in its workplace to the ACGIH Ceiling limit
MAK:	The company aims to control exposure in its workplace to the German limit
Sk:	Can be absorbed through skin
Sen:	Capable of causing respiratory sensitization
Bmgv:	Biological monitoring guidance value (UK HSE EH40)
ILV:	Indicative Limit Value (UK HSE EH40)

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